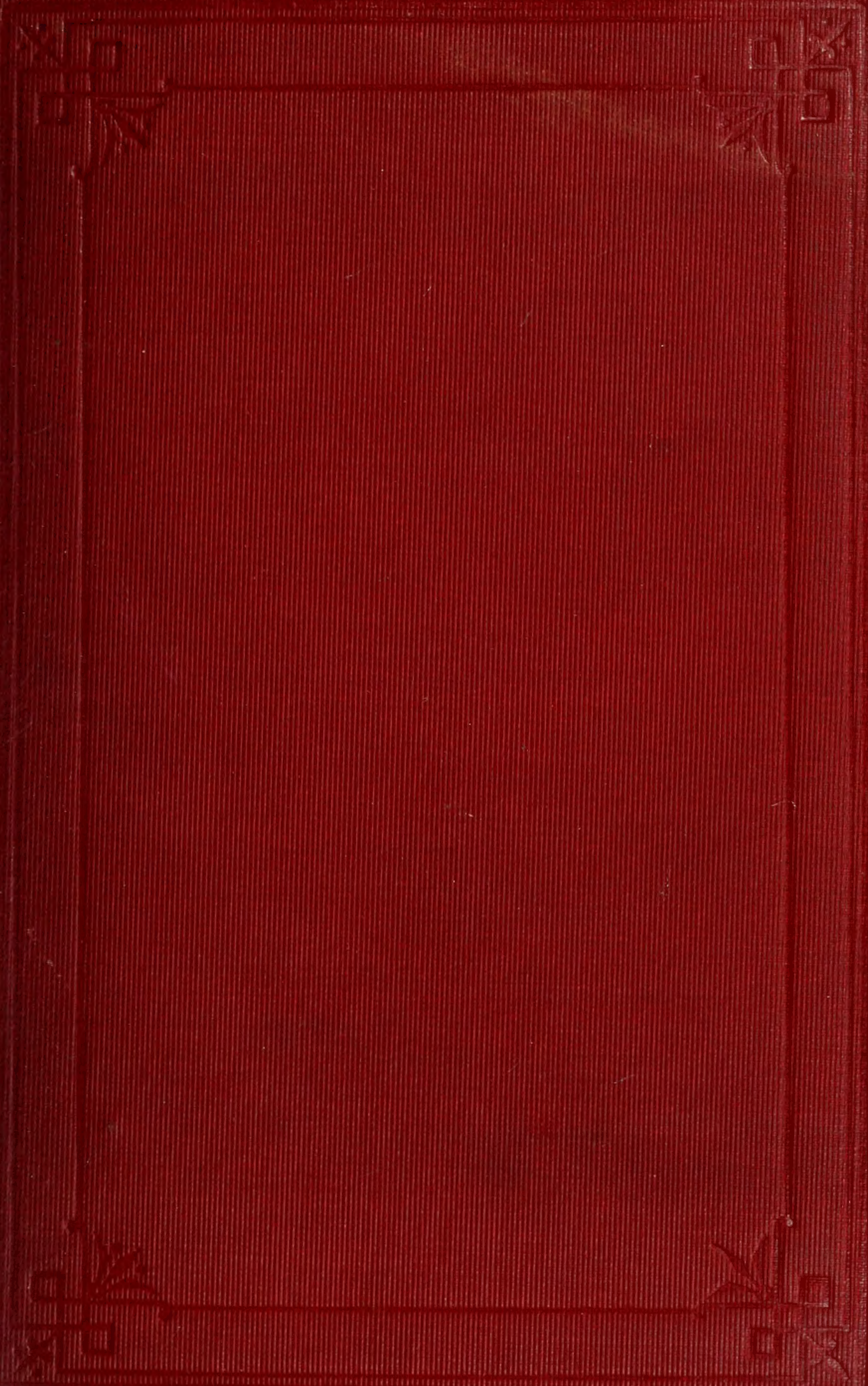

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The
Practical Medicine Series

Comprising Eight Volumes on the Year's Progress in
Medicine and Surgery

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Volume VI

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PHARMACOLOGY AND THERAPEUTICS

GENERAL CONSIDERATIONS

NOMENCLATURE

New Names for Synthetics. As was reported in previous volumes of this publication[1] the Council on Pharmacy and Chemistry of the American Medical Association has accepted and promulgated the following non-proprietary, ''All-American'' names:

Arsphenamine for ''Salvarsan,'' ''Arsenobenzol,'' ''Diarsenol,'' ''Arsaminol.''
Neo-arsphenamine for ''Neosalvarsan.''
Barbital for ''Veronal.''
Barbital Sodium for ''Veronal sodium.''
Procaine for ''Novocain.''
Cinchophen for ''Atophan.''

This year the Council[2] has adopted the following non-proprietary names:

Acetannin for ''Tannigen.''
Albutannin for ''Tannalbin.''
Benzocaine for ''Anesthesine.''
Eucatropine for ''Euphthalmine.''
Phenacaine for ''Holocaine.''
Neocinchophen for ''Novatophan.''
Phenetsal for ''Salophen.''

To aid in the emancipation of the medical profession from proprietary medicine domination, the non-proprietary names will be employed by preference in this publication.

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(1) Practical Med. Series, Vol. VI, 1918, pp. 12-14; Vol. VII, 1919, p. 9.
(2) New and Nonofficial Remedies, 1920; also Jour. Amer. Med. Ass'n, June 5, 1920; March 27, 1920; and May 1, 1920.

The following American synthetics were investigated by P. N. Leech, W. Rabak, and A. H. Clark,[3] at the Chemical Laboratory of the American Medical Association. Arsphenamine, Barbital, Barbital-sodium, Cinchophen, Procaine, and Procaine nitrate; they found the quality of these preparations second to none.

METHODS OF ADMINISTRATION

Painless Hypodermic Injection. In very sensitive patients, the pain of the needle puncture in giving hypodermic injections should be minimized so far as possible. This can be done by one of the methods illustrated in Figures 1 and 2. Pinching the skin into a fold in which the needle is introduced is the method preferred by J.

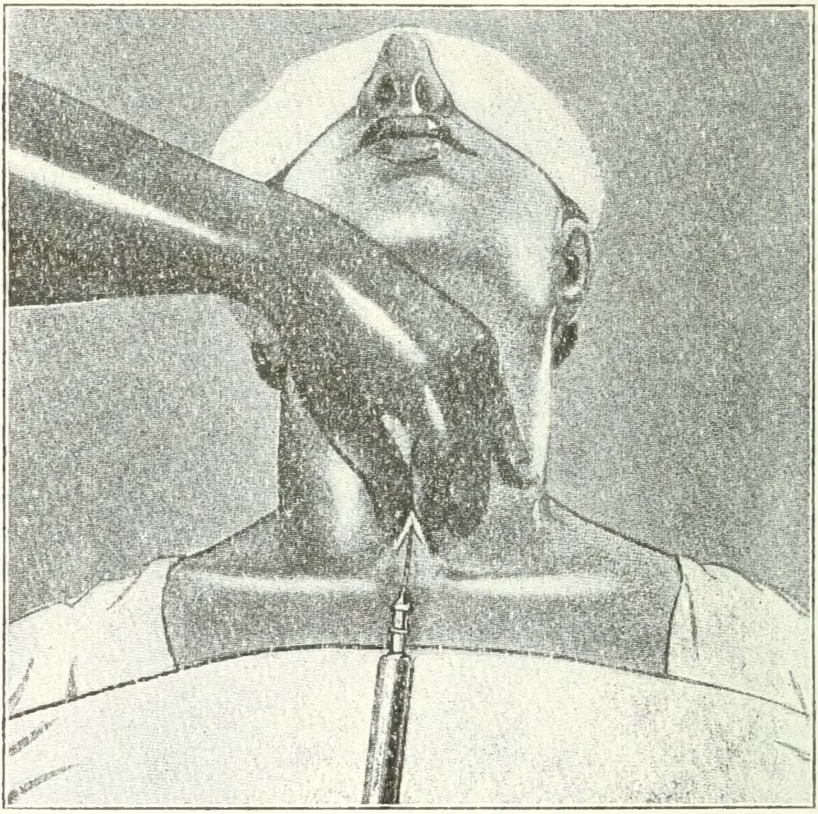

Fig. 1. Simple method for making first introduction of small hypodermic needle almost painless—blunting sensation by pressure.

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(3) Jour. Amer. Med. Ass'n, Sept. 6, 1919.

R. Eastman,[4] while the application of a piece of cotton frozen with ethyl chloride and held on the skin for 30 seconds is the method advocated by J. T. Mason.[5]

A. A. Robinson,[6] reports that hypodermic administration of sodium cacodylate is rendered painless by the addition of about 5 minims of a 1 per cent. solution of procaine. Such solution of procaine will not precipitate the ordinary dose of sodium cacodylate. Stronger solutions, however, will do so.

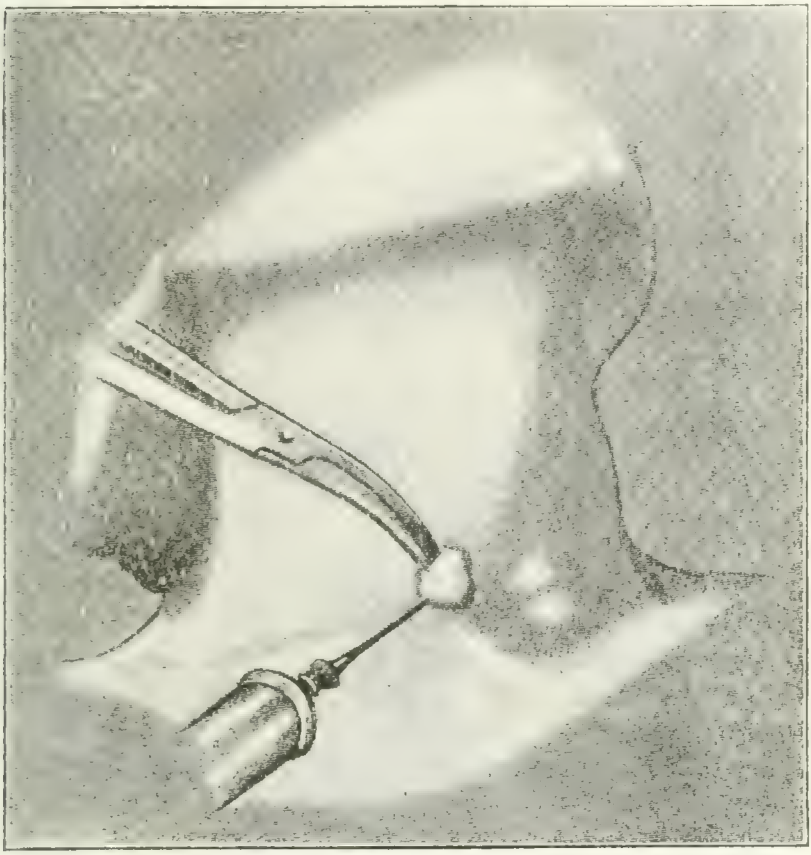

Fig. 2. A piece of cotton is frozen with ethyl chloride and held on the neck for thirty seconds. A needle can be inserted under this without pain and without the patient's knowledge of what is being done.

[Addition of local anesthetics may be resorted to in order to antagonize the pain of other painful injections,

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(4) Jour. Amer. Med. Ass'n, July 17, 1920.
(5) Ibid.
(6) Ibid., Sept. 4, 1920.

e.g., quinine and urea hydrochloride with mercury salicylate.—Ed.]

Technique of Hypodermoclysis. Dr. Willard Bartlett,[7] advises continuous hypodermoclysis, using the visible dropper and screw clamp, and employing plain, freshly distilled water, as harmful effects occasionally follow the absorption of abnormal amounts of sodium chloride. The water is heated to between 100° and 110° F. The injection is made at a point near the outer border of the pectoral muscles, midway between the nipple and the head of the humerus. Here absorption is almost twice as fast as it is when the injection is under the breast alone. Only one side is used at a time. Usually from 800 to 1200 c.c. are given during one injection, though a much larger amount may be given. The procedure has completely supplanted rectal administration with greatest satisfaction.

An Improved Fordyce Needle for Intravenous Therapy. The Fordyce needle, the best needle for the administration of arsphenamine, has been modified by E. W. Abramowitz[8] by a stem through the hub beyond the holder, to enable one to collect blood without soiling the patient and then to proceed with the administration of arsphenamine without puncturing the patient again. The needle is shown in Figure 3.

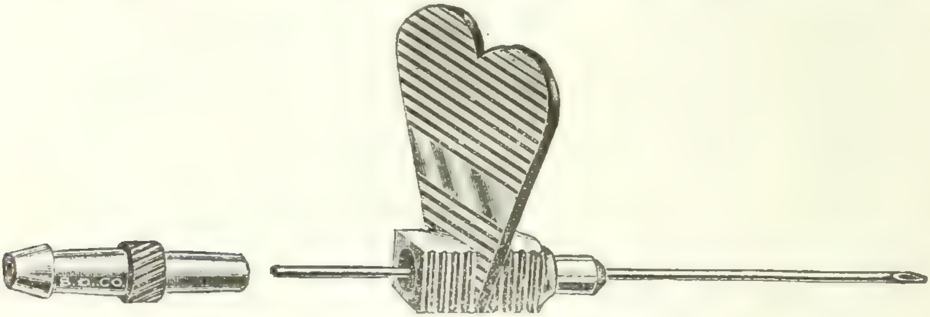

Fig. 3. Improved Fordyce needle for intravenous therapy.

Continuous Intravenous Infusion. M. Friedmann[9] warmly recommends the drop method for prolonged intravenous injection, which he has employed for the last seven years with good results. By allowing from 20 to 200 drops a minute to flow into the vein, the sudden embarrassment of the generally weakened circulatory mechanism is avoided. Such injection may be continued for hours, even days. The author employed 0.9 per cent. sodium chloride, with occasional addition of 1 mil of digilen or of epinephrine, 1-1000 solution (1 mil to 750 mils). In cholemic hemorrhage Friedmann repeatedly infused from 200 to 400 mils of 10 per cent. sodium chloride solution with 0.02 per cent. calcium chloride, at times with marked success. He also used sugar and sodium carbonate solutions in this manner. Camphor water gave no result when used against circulatory weakness in pneumonia or peritonitis. Collargol, up to 200 mils of 2 per cent. solution, was without effect in sepsis. The obese and the arteriosclerotic sometimes do not tolerate these injections. In extreme cases hypostatic pneumonia developed with remarkable frequency.

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[7] Jour. Amer. Med. Ass'n, Jan. 17, 1920.
[8] Ibid., July 31, 1920.
[9] Deutsch. Zeitschr. f. Chirug., 1919, p. 352.

Danger of Intravaneous Administration of Colloids. The increasing popularity of intravenous medication, makes the experimental observations of P. J. Hanzlik and H. T. Karsner[1] of importance. They find that even such otherwise harmless colloidal agents as agar, acacia, gelatin, glycogen, starch, and dextrin which possess no demonstrable pharmacologic action and are non-toxic are capable, on intravenous injection, of producing definite anaphylactoid symptoms, such as respiratory distress, pulmonary distension and congestion, hemorrhages and, some of them, thrombi. These disturbances occurring as they do even in unsensitized animals do not necessarily constitute true anaphylaxsis.

These observations are of importance, most especially in view of the recommendation of the intravenous use of acacia in treatment of shock.

Similar results were also obtained with peptone, protein, collargol, arsphenamine, neo-arsphenamine, nuclein solution, bile, typho-bacterin, phylacogen. The results obtained are decidedly against the intravenous method of administering drugs as a routine therapeutic measure.

The authors found that, while intravenous injection of atropine can completely prevent the toxic effects pro-

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(1) Jour. Pharm. and Exper. Therap., January, 1920.

duced by the intravenous injection of beef serum and peptone and while epinephrine given intravenously prevents death from true anaphylactic shock in guinea-pigs, these exert no protection against the effects of acacia, dextrin and starch. In the basis of these results it appears that the effects of the latter bear no relationship to true anaphylaxis. Partial protection was afforded by epinephrine as well as atropine against the circulatory disturbance produced by arsphenamine.

While the distension of perfused guinea-pigs' lungs produced by peptone and histamine is due to active stimulation of bronchial muscles, that produced by agar is due to compression of bronchioles by emboli in the pulmonary vessels.

Mode of Therapeutic Action of Intravenous Injections. Charles Greene Cumston[2] favors the idea that no matter what substance is injected into the blood there always follows an identical vasculo-sanguineous crisis with nervous and febrile manifestations, followed by a hematic and leukocytic reaction, then a return to the normal state. The phenomena of the reaction are, in all cases, quite alike, whether they are colloids, collobiases, sugar, peptones, sera, or plasma. It is a reaction of defense against the sudden introduction of foreign bodies into the blood. It occurs no matter what foreign body enters the circulation. The reaction is also identical with the malarial paroxysm, which is the consequence of a hemoclasic shock identical with that resulting from the sudden intravenous introduction of foreign matter.

The author calls special attention to the remarkable leukogenous action of sugar given intravenously. Within thirty minutes after the injection the leukocyte count reaches from 7,000 to 25,000 and remains at this figure for from two to three hours, afterward falling to about 15,000. The injections produce quite as marked reactions as the colloid metals, sodium nucleinate, etc. This action manifests itself clinically shortly after the injection by a transitory rise in temperature of a few tenths of one degree, ushered in by a severe chill and followed by sweating, as in a malarial paroxysm. Intravenous injections of an isotonic solution of sugar—glucose, saccharose, or lactose—have been employed to increase the

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(2) New York Med. Jour., Sept. 11, 1920.

number of leukocytes and to heighten the resistance to infection. **Humbert**, of Geneva has resorted to intravenous injections of sugar in pulmonary tuberculosis with good results.

Intravenous injections do not always result successfully, first, because the subject may not react when worn out. Secondly, certain individuals are either very sensitive or very refractory to such bodies; consequently the reactions are very violent, even fatal at times, or else they are *nil*. In some cases, by changing the nature of the substance injected, results are improved.

Intracardiac Injection. This method of appeal to a failing heart, most especially by means of epinephrine, constitutes the most powerful and prompt heart stimulation known, and therefore deserves serious consideration. A number of articles on this subject have appeared in continental literature, some of which are summarized by K. Vogeler[3] who also reports a case of his own in which temporary improvement was obtained, and refers to a case reported by Zuntz[4] in which this method succeeded in saving the patient.

The technique of this procedure is described by J. Volkmann[5] who advocates that the puncture be made just to the left of the sternum in the fourth intercostal space, the needle being inclined somewhat cephalad. The right ventricle is reached at a depth of 4 to 5 cm. He advocates the injection of 1 mg. epinephrine in 70 c.c. of physiologic saline solution, so as to excite the heart to contraction by the distention as well as by the drug.

E. Vogt in 1919 advocated intracardiac injection in the treatment of asphyxia pallida of the new born introducing 0.5 c.c. of physiologic salt solution, or 0.2 to 0.4 c.c. of solution of hypophysis, or 0.3 c.c. of digipuratum. Success has hitherto been merely transitory.

Continuous Vesical Irrigation. A. P. Jones[6] calls attention to the great value of continuous irrigation of the bladder, by means of a two-way catheter, in the treatment of severe cases of ulcerative cystitis in the female.

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(3) Deutsch. med. Wochenschr., July 1, 1920.
(4) Münch. med. Wochenschr., May 23, 1919.
(5) Therap. Halbmonatsh., Jan. 1, 1920.
(6) Virginia Med. Monthly, October, 1920.

THERAPEUTIC TECHNICISMS

Removal of Adhesive Plaster with Gasoline. Alanson J. Abbe[4] advises taking a little gasoline in a common medicine dropper, scratching up with one's finger nail the tip of a corner of the plaster, letting a drop of gasoline flow under the edge, and instantly an inch of plaster will be loosened. Another drop will remove the next inch, and so on.

R. E. Dickson[5] says that if one will use gasoline, wiping the plaster over with it, and then, with a little gasoline-soaked gauze or cotton, peel the plaster back from the skin, beginning at the edges, until it has been removed entirely, the patient will be happy and so will the physician.

Boric Acid in Thrush. E. Steinert[6] suggests giving the child a boric acid teat to suck. This helps by its antiseptic as well as mechanical effects.

Spirit of Camphor in Hay Fever and Asthma. E. Stuver[7] reports a case in which relief was obtained by pouring some spirits of camphor in the hand, holding it to the nose and inhaling freely—repeating several times if necessary to check the trouble. An inhalant composed of 20 grains of menthol in an ounce of chloroform or alcohol also gives great relief in many cases. The menthol added to spirit of camphor might do still better.

Small Enema in Constipation. L. H. Levy[8] calls attention to the use of soft soap containing either glycerine, turpentine, cottonseed oil or mixtures of these. One or two teaspoonfuls are added to 4 ounces of warm water and injected directly into the rectum by means of a rubber bulb syringe of 4 ounces capacity. This makes a nice method for rapid use and rapid results, and is especially useful in cases of rectal constipation.

℞	gm. or c.c.
Rectified oil of turpentine	5.0
Cottonseed oil	25.0
Glycerine	45.0
Soft soap	45.0
Oil of peppermint	a few drops

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(4) Jour. Amer. Med. Ass'n, Sept. 4, 1920.
(5) Ibid.
(6) Zeitschr. f. Kinderhlk., May, 1920.
(7) Western Med. Times, August, 1920.
(8) Jour. Amer. Med. Ass'n, July 17, 1920.

With smaller amounts of the soft soap mixture, this method can be used safely in children.

Hydrogen Peroxide in Fecal Impaction. L. J. Hirschman[9] finds 25 per cent. hydrogen peroxide enemas of the greatest service in treatment of fecal impaction.

A Simple Method of Obtaining a Paraffin Film for First-Aid Treatment in Burns. J. R. Garrood[1] suggests dropping on the burn the melted wax of a burning candle held at a fair distance—about 10 inches,—so that the paraffin is not too hot when it falls upon the injured part. It is well not to keep dropping on one place but to dodge about over the surface. The dressing is completed by patting a small piece of clean linen or absorbent cotton over the wax and dropping some more wax upon it.

Pleural Puncture Simplified. George Magnus[2] suggests that the trocar be passed through the tip of a rolled-up rubber finger cot from the inside. The finger cot is then unrolled, so that the handle of the stylet is in part loosely covered. As soon as the trocar has been introduced and the stylet has been removed, the exudate flows through the cannula and then through the finger cot loosely down hanging. The moment the patient inspires the rubber applies itself like a valve to the outer opening of the cannula and prevents the entrance of air into the pleural cavity. During expiration the fluid pushes the rubber away from the opening and escapes unimpeded.

Pepsin for Removal of Crusts and Membranes from the Nose. B. Griessmann[3] recommends for the removal of crusts and membranes in the nose after nose operations, and in diphtheria, most especially in ozena, a pepsin-boric-acid powder of the following composition:

℞	gm. or c.c.
Pepsin	20.0
Boric acid	10.0

Mix, 2 knife-point-fuls, dissolved in 0.5 liter of lukewarm sterile water.

Label it to be used as a nasal douche three times daily, and

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(9) Jour. Amer. Med. Ass'n, Oct. 4, 1919.
(1) Brit. Med. Jour., April 17, 1920.
(2) Therap. Halbmonatsh., Jan. 1, 1920.
(3) Beitr. z. pathol. Anat., 1920, p. 128.

snuffed into the nose five or six times a day. Later, two irrigations and snuffing three times a day will suffice.

The success of this treatment depends upon the digestive action of the pepsin. A 10 per cent. solution may also be used as a laryngeal spray and in the pharynx.

Topical Uses of Pepsin. On the basis of the observation that pepsin in acid medium is capable of partially digesting the horny layer of the skin, and making it permeable, P. G. Unna[4] recommends the use of the following mixture:

℞

Pepsin	2 gm.
Hydrochloric acid	
Phenol, of each	1 c.c.
Distilled water, to make	200 c.c.

Applied in form of compress over night and covered with impermeable material, this solution has given excellent results in keloids and other scars and indurations, in scleroderma, hyperkeratosis, fistulas, and poorly healing ulcers. Unna also suggests that such compresses might permit deeper penetration of medicaments.

For use during the day the following ointment is recommended:

℞

Pepsin	10 gm.
Hydrochloric acid	
Phenol, of each	1 c.c.
Ointment base	100 gm.

In view of the fact, that pepsin also digests collagenous connective tissue, injections into scars or developing scar tissue,—to prevent stricture formation—of the following fluid is recommended:

℞

Pepsin	10 gm.
Phenol	
Hydrochloric acid, of each	1 c.c.
Distilled water to make	100 c.c.

Five cubic centimeters are injected weekly.

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(4) Berlin. klin. Wochschr., 1920, p. 77.

Pancreatic Ferments in Wound Dressing. Ernest Halin and Emil Leuk[5] have used pancreatic enzymes in the form of ointments, powders, and aqueous solutions of various concentrations. The ointments were applied about 5 mm. in thickness, and the powders so that the wound was rendered invisible. These preparations were used with marked benefit in suppurative inflammation of the subcutaneous tissue; in suppuration in burns of the second degree; in furunculosis; in suppurating gunshot wounds; in difficultly healing fistulas; in weeping eczemas, and in whitlow. The most striking phenomenon is the rapid disappearance of the pus, which is quickly digested by the enzymes. Granulation sets in soon. Many cases that had become chronic under other treatment were successfully handled in this manner.

Uses of Thigenol. F. Kuhn[6] considers thigenol (a solution of the sodium salts of synthetic sulpho-oleic acids, N. N. R.) the prophylactic *par excellence* against the spreading and new development of furunculosis. Painting the vicinity of the furuncle with thigenol, which sticks well and presently dries, protects the skin most efficiently against infectious pus and the development of fresh furuncles.

In severe infantile intertrigo, E. Sluka[7] recommends painting with the following mixture:

℞	gm. or c.c.
Thigenol	1-2.00
Zinc oxide	
Talcum, of each	20.00
Glycerine	
Distilled water ... of each	30.00

Mix. Apply to affected parts and cover with dusting powder.

℞	gm. or c.c.
Zinc oxide	
Talcum, of each	30.00

Mix. Use as dusting powder.

The author also recommends the following thigenol salve in facial eczema:

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(5) Med. Klinik, Nov. 21, 1920.
(6) Therap. Halbmonatsh., Feb. 1, 1920.
(7) Wiener med. Wochschr., 1920, p. 187.

℞	gm. or c.c.
Thigenol	0.5-1.0
Solution epinephrine	
Anesthesine, of each	5.0
Zinc oxide	
Talcum, of each	10.00
Petrolatum	30.00

Mix. Apply to affected parts.

Solution of Ferric Chloride in the Treatment of Erysipelas. C. T. Larkam[8] reports success in the treatment of virulent erysipelas by means of the strong solution of perchloride of iron. The part affected is thoroughly painted with the perchloride solution, continuing the painting two inches above the lesion on healthy skin. Lint soaked in the perchloride solution is then applied and this is covered with absorbent cotton. The dressing is changed twice daily.

MISCELLANEOUS MAXIMS

Pointed Paragraphs from Practice. Arthur Campbell's article on ''Maladies and Medicines''[9] yields the following practical points:

In acute bronchial catarrh, syrup of ipecac, with small doses of solution of bismuth, given frequently in the afternoon and evening and sparingly early in the day, is a quickly effective remedy in softening the harsh, dry cough, relieving the chest pain, and in reducing temperature and discomfort. To children 0.60 c.c. of the syrup may be given in very acute cases in the evening every one-fourth or one-half hour until six or eight doses have been taken, and then at longer intervals.

In epilepsy, borax in 1.3 gm. doses dissolved in hot water given three times daily is a most effective treatment which does not dull the intellect as do the bromides, is practically tasteless, and does not interfere with digestion.

Barbital, while useless in epilepsy, is of incalculable value, Campbell believes, in the convulsions of children; from 0.12 to 0.18 gm. dissolved in hot water for children of from 6 to 18 months has never failed to relieve, and has never, in his practice, produced any bad result.

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(8) Brit. Med. Jour., Jan. 1, 1921.
(9) Practitioner, April, 1920.

A reduction in the consumption of fat-producing foods makes an enormous difference to primiparae and to women with deformed or narrow pelves.

In "nephritis dolorosa"—a disease in which there is usually considerable acidity of urine and a tendency to the formation of calculi, in some of which cases small stones are passed with relief to the patient, while in others no stone is formed, yet the severity of the pain is just as great—prompt relief was obtained from repeated large doses of citrate of soda in warm water—4 gm. doses in half a tumblerful of warm water every half hour or hour for half-a-dozen doses. The same drug, in smaller doses twice or three times a day, combined with an almost meat-free diet and abstention from much exercise, gave excellent results after the acuteness of the attack had subsided.

Axioms of Therapy in the Aged. The following aphorisms are taken from the article of T. S. Blair.[1]

Aged persons are apt to take too much medicine, often most unwisely. A surprisingly large proportion of drug addicts are aged people; and they are most difficult cases to treat successfully. "Many discomforts in the aged come from normal physiologic changes. Do not mistake these changes for disease and thus be induced to medicate the aged person for conditions drugs assuredly can not help."

Sedatives and hypnotics are rarely required in old age, though they may appear to be. The aged person is apt to sleep so much by napping in the daytime that he may be wakeful half of the night, and he thinks he is suffering from insomnia.

Much of the so-called pain in the aged is merely the fear of pain, or simple tenderness may be described as pain. A disagreeable placebo may cure many a "pain" in aged persons.

Never give cold baths or use the ice-bag with very aged persons, as the shock is too great.

Senile debility is a concomitant of many diseases in the aged person, and it may include labored breathing which passes as asthma, stiffening of the joints which

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(1) Therap. Gazette, May 15, 1920.

may be mistaken for chronic rheumatism, and even senile tremor which is thought to be serious nervous disease. Medication does little for such patients and may do harm. Senile tremor is aggravated by bromides. Tonics and stimulants may be indicated, never depressing or narcotic drugs. Strychnine, phosphorus and small doses of arsenic may be indicated, while coffee may do a great deal of good.

When cardiac compensation begins to fail, absolute rest does more good than medicine; and small doses of arterial sedatives are more valuable than digitalis. In fact, digitalis is dangerous in senile conditions.

In severe attacks of dyspnea, morphine following atropine may be necessary. Rarely should morphine be given alone in the aged; it depresses respiration. Another drug to be rigidly excluded in senile conditions is hydrated chloral. Barbital may, however, be administered safely. Morphine is unwisely used far too often in the treatment of cardiac asthma. It is invaluable in an emergency; but, if we allow the aged asthmatic to become addicted to morphine, we lose it wholly as a remedy to meet severe attacks; it becomes an agent to which he is enslaved. Aside from cardiac dyspnea, it is senile emphysema that causes dyspnea in the aged in most cases. A warm, dry climate is the best cure. The iodides often do senile asthma a world of good. Bronchial and laryngeal troubles in the aged should never be neglected or put off by the prescribing of a mild narcotic; they need study and intelligent care, as these cases allowed to drift along may eventuate in senile pneumonia, which is not noticed until the signs of cyanosis or pulmonary edema arise and the case is hopeless. Senile pneumonia is seldom diagnosed in the early stage.

Senile rheumatism is really arteriosclerosis, and there is pain only on motion. Salicylates and counter-irritation are useless, medicines to overcome the senile debility being indicated. There is, of course, a true chronic rheumatism encountered in the aged. In the pain of arthritis deformans, salicylates are often of great value. Gout is infrequent in the aged and then colchium is useful, but only in the acute attacks. Myalgia is frequent in old people and often is very painful. Rest, heat, and sometimes galvanism are indicated. Senile pruritus may give rise to anything from mere discomfort to acute agony. Cocaine ointment is more valuable than any medication internally.

Senile neuritis is less painful than is neuritis in earlier life, but the pain is apt to be constant. Local analgesics are of great value and narcotics are rarely needed. Hemorrhoids are, usually, less painful when encountered in aged persons than when found in earlier life, but they are very apt to induce most aggravated pruritis, which is a serious factor in old people and must be relieved by local applications of cocaine or other local anesthetic.

Peritonitis is rather infrequent in the aged, but is nearly always fatal. Fortunately, there is little pain; but, like acute pancreatitis, it kills. The aged person possesses a greater immunity to bacteria than do younger persons. Aged persons are apt to escape in epidemics. Infectious pneumonia in the aged is usually rapidly fatal. ''Never give narcotics therein; the respiratory center is weakened at best, and narcotics may kill.''

No one can criticize the physician who resorts to the use of narcotics to relieve the long-drawn out suffering of the cancer victim.

Hygiene in the aged is neglected, and much pain and discomfort result in consequence. The aged need constant and sympathetic care and attention. ''Give the aged person something to stimulate mental interest and arouse him. Maintain his pride and encourage mental activity. Take him some magazines he likes; take him to the theater with you. Good food should be provided. Exercise in the sunshine, fresh air, good water, and plenty of sleep are good for the aged. Take care of the aged person's feet and see that he has good shoes and clothing. Do not deny the aged man a reasonable amount of tobacco; it is a great comfort to him; and if he is accustomed to its use it rarely hurts him appreciably.'' Travel is good for the aged. Do not let the aged person think he is a burden to others.

ETIOTROPIC THERAPY

CHLORINE GROUP

Methods of Eusol Application. It is refreshing to note the article by James B. Hogarth[2] in which it is stated that the Carrel method, which has become somewhat stereotyped and routinistic, can be improved upon by adapting the mode of application to the condition of the wound. In all the forms suggested, Hogarth insists on the solution being used warm or hot, as better results were obtained that way. The following are the various methods employed:

As simple lotion, or diluted with an equal quantity of 10 per cent. saline in wounds of a more or less superficial character: These wounds were simply bathed with the warm lotion, perforated oiled silk protective being placed around the edges, and sterile gauze then applied.

As a gauze dressing without waterproof, after the septic process has been brought under control by means of fomentations: As the granulations are apt to become rather edematous after continued fomenting, evaporation of moisture from the wound by this means is of advantage.

As a fomentation in all foul, freely suppurating wounds, wet eusol dressings produce a rapid and permanent subsidence of feverish symptoms: Fetor is rapidly eliminated. When sloughs are present in the wound, their separation takes place more quickly under the influence of eusol fomentations than they do when similarly treated by boracic acid. The initial smarting sensation is of short duration, the amount of skin irritation almost negligible. As soon as discharge becomes like blood-tinged serum, fomentations are discontinued and wet gauze dressings employed.

As a bath, eusol is employed full strength at a temperature of about 110° F., once or twice a day for about an hour or two: Wounds of the hand, forearm, or foot are specially suitable for this mode of treatment.

By means of continuous irrigation, the method best adapted for large open wounds of some depth. To en-

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(2) Edinburgh Med. Jour., October, 1919.

sure a continuous flow of fresh warm antiseptic into the wound and more complete drainage, the author devised an apparatus illustrated in Figure 4.

Articles necessary for its construction are: "(1) A glass bottle with a wide neck, and with a capacity of about 6 oz.; (2) a piece of V-shaped glass tubing with a caliber of about 3/8 in.; (3) three feet of rubber tubing with a caliber of about 1/4 in.; (4) a ball of spirit-lamp wick, the fiber of which should not be too fine, as otherwise it will be more readily destroyed by the eusol solution; (5) a short length of thin iron wire; (6) a silver probe with an eye; (7) a set of cork borers; (8) a glass spool."

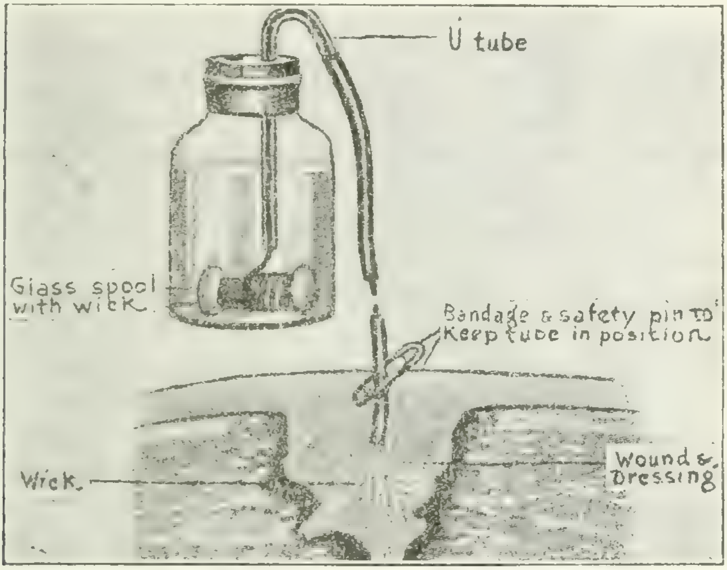

Fig. 4. Methods of eusol application.

"A hole of suitable size to admit the V tube is first bored in the cork, and another which remains open in order to secure equalization of air pressure. A piece of glass tubing with a caliber of about 3/8 inch is then bent into the form of V and the ends rounded in the flame, the latter process being performed to prevent cutting or fraying of the rubber tube. Having inserted the V tube in the cork, we take the glass spool; and, winding round it a sufficient quantity of spirit-lamp wick as a reserve, we leave free a length of about four feet. Now take the iron wire, pass it downward through the V tube, fasten it to the free end of the wick, and draw it through. Detach the wire, thread the eye of the probe with the wick, and it is now an easy matter to pass the wick through the whole extent of the rubber tubing. Lastly, fit the rubber tubing over the end of the V tube, fill the bottle with eusol, place the spool in the bottle and the apparatus is ready for use.''

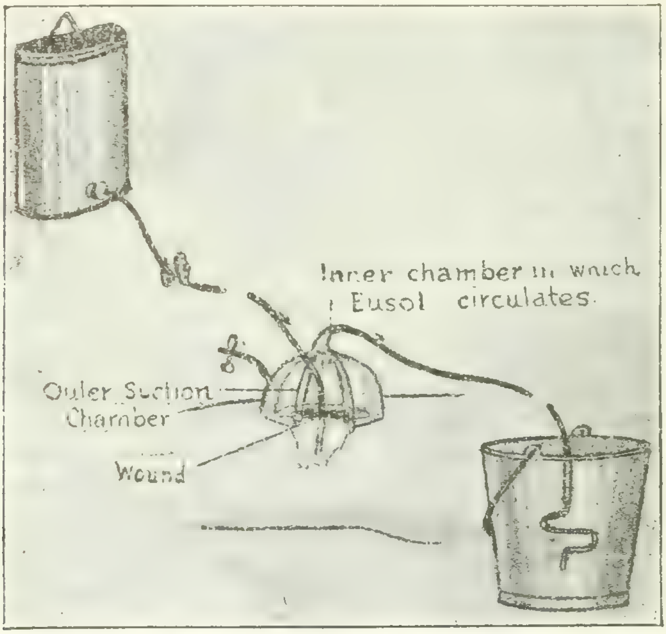

Fig. 5. Diameter of outer chamber, 3½ inches; diameter of inner chamber, 2½ inches; height of inner chamber, 2½ inches.

The solution should be kept warm, which can easily be done by placing the bottle in a bowl of water at a temperature of about 120° F., or by the use of a thermos flask. The reservoir should be situated at such a height above the wound that the drop-rate from the wick does not exceed about ten drops a minute; otherwise the dressings become unnecessarily wet. The wick should be placed well over the surface of the wound; or, in case of a deep wound, toward the bottom of it. When treating a deep wound, a gauze dressing should be packed lightly into it. When after a time, especially if the wound under treatment is very septic, the solution is not flowing satisfactorily from saturation of the wick with pus, it is a simple matter to remove the tube from the wound, pull down the wick, and cut off the part which has become blocked.

To avoid skin irritation, the application of sterile vaseline to the skin in the region of the wound is advisable. The apparatus described was used in the Royal Infirmary in Edinburgh before the Carrel apparatus was introduced. It has the advantage that it can be improvised from materials readily obtainable.

As a further improvement, the author has devised an apparatus which adds suction hyperemia to the possibility of intermittent flushing of the wound and continuous drop by drop irrigation. The accompanying diagram (Fig. 5) illustrates the construction and mode of action of the instrument, which consists of an outer and inner chamber, the outer chamber serving as a means of fixing the instrument in position over the wound by means of air suction, the inner chamber through which the eusol solution is intended to circulate, is provided with inlet and exit openings. "By using this apparatus, we are enabled to secure, during the period of its application, all the advantages of continuous lavage and efficient drainage coupled with increased lymph lavage by combining eusol with an equal quantity of 10 per cent. saline and by the hyperemia produced by the application of the instrument, which increases not only the lymph flow, but also, by the hyperemia of the wound edges, causes greater phagocytic infiltration and all other advantages of hyperemia. The exclusion of air might further be of advantage against aërobes, such as the pyogenic organisms. The temperature of the solution is kept about 110° F., and the period of application need not exceed three hours. This instrument is also well suited for supplying an antiseptic in the form of a gas."

Alternate use of eusol and potassium iodide plugs is recommended by Hogarth in the treatment of persistent sinuses, the rationale of the treatment being that irritation in a mild degree would be set up by the deposition of free iodine on the walls of the sinus, and the process of granulation so stimulated. It has been his practice to use in the morning a plug soaked in 40 per cent. potassium iodide, and in the evening to employ full strength eusol in a similar fashion. The smarting sensation, occurring on the application of the potassium iodide solution, is not in any way excessive nor of long duration.

The Intravenous Use of Eusol. A. L. Gregg,[3] in view of a number of favorable reports on the intravenous use of eusol[1] in septicemia, pyemia, and toxemia, took the opportunity that presented itself of treating a number of cases of influenza often complicated by bronchopneumonia with such intravenous injections.

For practical purposes it was found convenient to have the eusol made up of double strength, or approximately 0.5 per cent., and a separate aqueous sterile solution of sodium chloride also of double strength—*viz.,* 1.7 gm. per 100 c.c. The technique of administration is very simple—100 c.c. of eusol are mixed in an Erlenmeyer's flask with 100 c.c. of sterile saline solution which has been brought to boiling point. A sterilized graduated funnel, rubber tubing, clip, and a sharp needle complete the apparatus. In the case of big strong men 120 c.c. were given, and in one case as much as 150 c.c. If the patient appeared restless during its administration it was stopped at about 70 c.c. In the cases with severe bronchopneumonia, except at its commencement, more than 50 c.c. were not usually given. In the majority of cases the eusol injections produced no immediate effect either subjective or objective. One patient perspired profusely while the fluid was passing into his vein. In four cases following the injection a smart rigor preceded a marked perspiration. The rigors occurred only in Indian natives. The cases also offer evidence for the absence of ill effects of eusol on the kidneys. This treatment the author believes, decreased the death-rate considerably. Undoubtedly toxemic cyanosis became less marked after each injection. To one bronchopneumonia patient who practically hovered between life and death for eight days, Gregg gave 50 c.c. of eusol three times at intervals of twelve hours, instead of the usual twenty-four, guided by nothing other than the appearance of

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(3) Dublin Jour. Med. Sci., February, 1920.

(1) A hydrochloride solution prepared by interaction between chlorinated lime and boric acid so as to contain 0.25 per cent. hypochlorous acid.

the patient's face, which became less cyanosed after each injection; and he is convinced that the eusol played a large part in reducing the acute toxemia present, and allowing Nature to rally all her forces, including sleep, to the patient's aid so that the latter made an unexpected and complete recovery after twenty-one days' fever, during which he had no less than nine injections of eusol.

The author believes that it could be adopted as a useful or even a safe line of treatment.

[The interesting feature of Gregg's report is the fact that the dosage used by him was evidently well borne. In view of the work of Fantus and Smith (see next abstract) great caution should be exercised in regard to increasing the dose or the chlorine strength of the intravenous injection. It is very doubtful, however, that these injections could be of much benefit. Dakin pointed out in 1916 that intravenous injection of eusol in therapeutic doses could not possibly have any direct bactericidal action—first, because its dilution by the blood is so great; and, secondly, because the available chlorine is rapidly decomposed into chlorides or other inert products. Besides, it causes some hemolysis and diminishes the coagulability of the blood; and in this way might do harm.—Ed.]

Pharmacology of the Chloramines. This was studied by B. Fantus and M. I. Smith[2] who point out that the chloramines are powerful irritants causing inflammatory edema of the subcutaneous tissues and even necrosis of the overlying skin on hypodermic injection, inflammation of mucous membranes on local application, and vomiting on oral administration.

Chloramine-T depresses the central nervous system in the order of brain, medulla and spinal cord. On intravenous injection pulmonary edema is produced, probably due to the irritant action of the chlorine gas on the pulmonary capillaries. The hemolytic power of chloramine-T is due chiefly to its alkalinity. *Hence, chloramine-T solutions would be decidedly dangerous on intravenous injections.*

Chlorine Antiseptics in the Treatment of Tuberculous Suppurations. In treating tuberculous abscesses with

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(2) Jour. Pharm. and Exper. Therap., November, 1919.

fistula formation, which are nearly always secondarily infected, G. Rottenstein[3] injects into them Dakin's solution every three hours, using the Carrel-Dakin method. In abscesses with multiple fistulas, intercommunication is established and the solution injected from one fistula so that it comes out from another, thus allowing large quantities of fluid to be injected. In those cases in which the solution gives rise to erythema with a burning sensation at the site of fistula, and in cases in which the fistulas are too narrow to admit a Carrel tube, he uses a paste containing 1 to 1.5 per cent. of chloramine-T dissolved in water containing 8.5 per cent. of fatty, acid-free stearate of sodium. This paste is commercially known as "steramine." The chloramine forms with the stearate of sodium a creamy preparation, which can be injected into the abscesses with an ordinary syringe, from which chlorine is liberated for twenty-four hours after the injection, so that introducing it once or twice a day suffices. In either case, the results are the same; the character of the suppuration changes from a watery fluid to a thick gluey, thready substance. The temperature usually comes down in from several days to several weeks. As soon as laboratory examination shows that there are no more cocci, Rottenstein replaces the chlorine paste by B. I. P. of the following proportions:

℞	gm.
Iodoform	5.00
Bismuth subcarbonate	30.00
Petrolatum	60.00

injection of which is preceded by a Dakin lavage. By itself B. I. P. has no value, but healing occurs rapidly if used after Dakin's solution. The whole treatment must be controlled by laboratory examinations. Most rapid results are obtained in relatively superficial fistulas. In the treatment of closed cold abscesses Rottenstein punctures the abscess and irrigates with Dakin's solution until it returns clear. Thus treated, the abscess will reappear after an interval; but will entirely disappear after two or three punctures. Rarely, four punctures are required. Fistulas appearing in exceptional

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(3) Presse méd., May 22, 1920.

cases after puncture usually heal spontaneously and rapidly. No B. I. P. is used in the treatment of closed cold abscesses.

Dichloramine-T Solution. V. J. Anderson[4] suggests rubbing up with a small amount of chloroform (carbon tetrachloride may be used) then adding chlorcosane. The chloroform is easily evaporated. In view of the fact that carbon tetrachloride (10 per cent.), has been recommended by Dakin and Dunham (1918) for lowering the viscosity of the chlorcosane, it would probably be better to dissolve the dichloramine-T in carbon tetrachloride and then add the proper amount of chlorcosane, as the carbon tetrachloride would not have to be removed by evaporation.

IODINE

Iodine Tinctures. Torald Sollmann[5] concludes that the presence of potassium iodide in the official tincture of iodine does not seem to render this preparation more irritant. On the contrary, it is somewhat less irritant to the skin, and much less precipitant to proteins, than the simple alcoholic tincture, or the secret and non-secret "miscible tinctures." The more even-spreading and the more rapid coagulation of protein render the simple alcoholic solution of iodine probably the best for the "disinfection" of the skin; while the delayed protein precipitation by the U. S. P. tincture would probably render this somewhat superior for the disinfection of open wounds. The secret and non-secret "water-soluble tinctures" do not appear to have any material advantage.

Tincture of Iodine in Large Doses for Internal Use. L. Cheinisse[6] summarizes the reports by several authors of favorable results from the use of tincture of iodine in high doses given internally in the treatment of pulmonary tuberculosis, tuberculous adenitis and rheumatism. Boudreau considers it a specific therapeutic procedure. It must, however, be given in prudent doses at the beginning, to be increased and pushed to the ex-

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(4) Jour. Amer. Med. Ass'n, Nov. 15, 1919.
(5) Ibid., Sept. 20, 1920.
(6) Presse méd., Sept. 25, 1920.

treme limit of tolerance. He usually begins with 20 drops a day and progressively raises it to 30, 40, 45 drops. In some cases he gives as much as 150. Indeed, in one case he gave as much as 350 per day and the patient tolerated it well for one month.

Cheinisse states that it is safe to give from 25, 30, and even 50 drops a day diluted in one glass of water. It is well to begin with small doses to find if idiosyncrasy exists. Under this management even grave cases of tuberculosis responded well.

Bird, of Guy's Hospital, London, found it very useful in a large number of cases of rheumatism. He begins with 1 gm. dose of tincture of iodine three times a day after meals for eight days and then increases to 2 grams three times a day during the second week and 3 grams three times a day during the third. Three or four cases of gonorrheal arthritis were also benefited by this treatment. When diarrhea occurs with the large doses, he gives smaller doses after a period of discontinuance. With the exception of a nasal catarrh most patients had no inconvenience. St. Aubyn-Farrer also obtained excellent results in rheumatic affections. He prescribes 2 gm. of tincture of iodine three times a day after meals, gradually increasing until 10 gm. a day are given and he says that it is remarkable to note how the pain and swelling of the joints disappear under this treatment. When this result is obtained, he gradually diminishes the doses to again increase it if needed after a short interval, especially in the long standing cases.

Dufour, of France, affirms that tincture of iodine constitutes the treatment of choice in tuberculous adenitis. He cites a case of tuberculous cervical adenitis which because of its large size caused dyspnea by pressing on the trachea. It had been treated with Roentgen rays; but the condition persisted. He obtained a cure by giving the woman tincture of iodine in milk in daily doses of 120 to 150 drops which he gradually diminished with successive periods of augmentation, stationariness and decrease of dosage. In cases of suppurative tuberculous adenitis, the pus is first evacuated; and then the iodine treatment instituted. Dufour concludes that this treatment is superior to any other employed. Iodism is the exception and not the rule.

Iodine and Ethyl Chloride in Ringworm. R. Hughes[7] paints the part with tincture of iodine. When thoroughly dry, the painted area is sprayed with ethyl chloride. The active agent is the small amount of ethyl iodide formed. This treatment is repeated twice a week.

Absorption of Iodine on Cutaneous Application. H. Kniepf[8] found that when rubbed into the skin in form of an ointment, such as an 8 per cent. lecithin salve, iodine is not absorbed through the skin, except in such minute amounts as to be of no practical importance. These experiments agree in general with the non-absorption of iodine from other forms of application, as, *e. g.,* those of N. C. Wetzel and T. Sollmann,[9] who state that the urine does not contain demonstrable quantities of iodine compounds after the application of tincture of iodine or the official or proprietary ointments, to the human skin. The authors admit that the failure to excrete iodine does not necessarily mean that none has been absorbed; for, if only a very small amount has been absorbed, it is conceivable that it has been retained completely in the body.

A. B. Luckhardt, F. C. Koch, W. F. Schroeder, and A. H. Wēiland[10] arrive at the opposite conclusion that iodine deposited on the skin is absorbed, and appears in the urine.

[This discrepancy in results is evidently due to larger dosage and more extensive application by the latter observers.—Ed.]

What is still more important, they present evidence that such applications cause a great increase in the iodine content of the thyroid gland, which is accompanied by a pronounced hyperplasia and increase in colloid of the thyroid acini. It is inadvisable, therefore, to employ extensive skin disinfection by means of tincture of iodine in cases of hyperthyria.

Absorption of Iodine on Inhalation. Luckhardt and his collaborators, after extensive animal experiments with inhalation of iodine fumes, arrive at the conclusion

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(7) Brit. Med. Jour., July 31, 1920.
(8) Therap. Halbmonatsh., July 15, 1920.
(9) Jour. Pharm. and Exper. Therap., April, 1920.
(10) Ibid., March, 1920.

that such administration is a dangerous procedure, owing to the development of pulmonary edema, when quantities greater than 18 mg. per kg. are inhaled. In view of the fact, that the edema supervenes more rapidly in animals having a respiratory disease (tracheitis and bronchitis of beginning distemper) than in normal animals, such administration is absolutely contraindicated in persons with pulmonary disease.

ARSPHENAMINE

Comparative Toxicity of Arsphenamine and Neo-arsphenamine. Jay F. Schamberg and John A. Kolmer[1] studied the relative toxicity of these two substances by intravenous injections in rats. They find that, when thus tested, neo-arsphenamine is about 2.4 times less toxic than arsphenamine. Hence, from the standpoint of margin of safety, larger amounts of neo-arsphenamine may be given and maintain the same ratio between *dosis therapeutica* and *dosis tolerata* as with arsphenamine.

Comparison of Therapeutic Value of Arsphenamine and Neo-arsphenamine. J. F. Schamberg, John A. Kolmer, and George W. Raiziss[2] conducted experiments for the purpose of examining the comparative therapeutic activity of arsphenamine and neo-arsphenamine, utilizing rats infected with a virulent strain of *T. equiperdum,* to ascertain the smallest amounts of arsphenamine and neo-arsphenamine that would sterilize the animals, using this method as a rather severe test of the therapeutic activity of the compounds.

They arrive at the conclusion that trypanocidal tests employing rats infected with *T. equiperdum* provide a means for determining the curative properties of arsphenamine and neo-arsphenamine. The trypanocidal activity of arsphenamine was found 1.74 times greater than that of neo-arsphenamine, which agrees remarkably with the findings of Castelli that arsphenamine was from 1.5 to 1.78 times more effective therapeutically than neo-arsphenamine. According to these results, 0.6 gm. arsphenamine equals 1.05 rather than 0.9 gm. of neo-

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(1) Amer. Jour. Med. Sci., August, 1920.
(2) Ibid., July, 1920.

arsphenamine in therapeutic activity. The trypanocidal dose (*dosis therapeutica*) of arsphenamine is 4.56 times less than the highest tolerated dose for the rat (*dosis tolerata*); the trypanocidal dose of neo-arsphenamine is 6.35 times less the highest tolerated dose. These results indicate that neo-arsphenamine is a somewhat safer compound than arsphenamine; even when 1 gm. of neo-arsphenamine is administered as equivalent in therapeutic activity to 0.6 gm. arsphenamine, the margin of safety is greater.

Hemolytic Activity of Arsphenamine and Neo-arsphenamine. J. A. Kolmer and Elizabeth Yagle[3] find that all solutions of arsphenamine are hemolytic. However, solutions of arsphenamine in isotonic saline solution are from three to ten times less hemolytic than solutions in water. The hemolytic activity is unavoidably increased by the addition of sodium hydroxide for purposes of neutralization; the addition of an excess of alkali increases hemolytic activity. Concentrated solutions of arsphenamine in water and in isotonic saline are more hemolytic than dilute solutions. The degree of hemolysis produced by the administration of arsphenamine may be lessened (*a*) by using, instead of water, sterile saline solutions of such strength as to render the solutions isotonic; (*b*) by avoiding the administration of concentrated solutions; (*c*) by carefully neutralizing and "clearing" the solution with sodium hydroxide, counting the drops or otherwise measuring the amount necessary, and adding not more than a fifth of this amount in excess, and (*d*) by giving the injections slowly so as to permit gradual mixing and dilution of the solution with the blood.

Neo-arsphenamine is not hemolytic. Dilute solutions of neo-arsphenamine in water, as 0.9 gm. in 90 c.c. or more of water, are hemolytic, owing to hypotonicity of the solution. Concentrated solutions, as 0.9 gm. in 30 c.c. of water or less, are not hemolytic, owing to the presence of sufficient organic salts from the drug to render the solution approximately isotonic. To avoid hemolysis in the administration of dilute solutions of neo-arsphenamine, sterile physiologic sodium chloride

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(3) Jour. Amer. Med. Ass'n, March 6, 1920.

solution prepared with freshly distilled water should be used; when concentrated solutions are administered (each 0.1 gm. dissolved in 3 c.c. or less), sterile distilled water may be employed.

Post-Arsphenamine Jaundice. G. S. Strathy, C. H. V. Smith and B. Hannah[4] report fifty-eight cases of poisoning following five or more weeks after the administration of arsphenamine. Forty-seven of these patients showed symptoms referable to the liver, namely: jaundice, decreased digestive power and liver atrophy. Eight of these cases were fatal and at autopsy showed atrophy of the liver. Atrophy of the liver may be marked in patients who ultimately recover. This condition can be diagnosed by *x*-rays. Dermatitis occurred in eight cases; five were severe with marked exfoliation. Peripheral neuritis was observed in two cases. Albuminuria was present in over 50 per cent. of the cases. Edema was found in two cases. On the appearance of these symptoms the administration of arsphenamine should stop, and the diet be reduced to a minimum.

Rupert Hallam[5] also directs attention to the prevalence of jaundice occurring during the treatment of syphilis with arsenobenzol preparations, and also to the facts that it is relatively more frequent with some preparations than with others, and that it sometimes occurs in an almost epidemic form. Icterus is an infrequent occurrence in untreated syphilis at any stage. After salvarsan treatment, jaundice occurs with varying degrees of frequency in various clinics, and in the same clinics at various times.

The attacks are usually very similar to ordinary catarrhal jaundice. The patients often have prodromal symptoms, such as nausea and anorexia; the icterus is well-marked; the urine is like that in catarrhal jaundice; the feces are usually, to a certain extent, pigmented; the liver is sometimes slightly enlarged, but in none of the author's cases was either the liver or spleen palpable. There is, as a rule, little pruritus.

The patient usually recovers in from two to six weeks. Cases, however, have been recorded which have com-

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(4) Lancet, April 10, 1920.
(5) Ibid., June 26, 1920.

menced as apparently a mild attack, but have become progressively worse, and terminated as acute yellow atrophy. In fatal cases, there is usually a higher degree of fever, followed by an afebrile second stage. During the second stage there is persistent vomiting, reduction in the size of the liver, abdominal pain and, after a few days, coma and death.

Postmortem the liver showed a high degree of central necrosis and fatty degeneration. A physician, in making a postmortem examination, accidentally cut himself. Within a few days he developed acute yellow atrophy of the liver and died.

While it may, therefore, be assumed that the use of arsenobenzol preparations is conducive to the production of jaundice during the treatment of syphilis, it is also evident that in view of the just reported occurrence and the irregularity in distribution of the cases, there must be another factor responsible.

Possibly an infection resembling Weil's disease may be the exciting agent in the causation of the post-arsphenamine jaundice. The comparatively sudden appearance of a series of jaundice cases, almost an epidemic, after many months' absolute freedom from any such complication in a clinic suggests a similarity of cause in these two forms of jaundice. There is one example known of a husband and wife suffering from post-arsphenamine jaundice.

Alexander G. R. Foulerton,[6] on the other hand, considers the jaundice of arsenobenzol compounds to be a toxic jaundice analogous to that produced by other poisons that have a special affinity for fats—chloroform, ether and tetrachlorethane,—which are active fat solvents, and phosphorus, dinitrobenzene, (D. N. B.) and trinitrotoluene (T. N. T.), which are readily soluble in fats.

The essential process of poisoning in these cases appears to be as follows: The poison, fixed in the food fat, is carried to the liver for the purpose of normal metabolism. Thus the destructive action of the poison is concentrated in the liver. The result is that the functional activity of the gland is impaired, with—among other

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(6) Brit. Med. Jour., June 26, 1920.

consequences—interruption of the process of desaturation of the food fat and engorgement of the liver with fat, lipemia, and engorgement of the kidneys with fat in process of excretion. As with the liver, there is also disturbance of the functional activity of the kidney as a result of the direct action of the concentrated fat-fixed poison. Whether the symptoms appear rapidly after a few doses, or whether they are delayed for six weeks after the completion of a full course of treatment, the final result is the same in a large majority of the fatal cases; jaundice, hematemesis, delirium and coma, with death within three, four, or five days.

By animal experiments the author found that the results characteristic of poisoning by arsenobenzol compounds may be produced by the action of arsenic alone. But, in view of the serious damage to the liver and kidneys in experimental poisoning with artho-amido-phenol, it is impossible to ignore the probability that the toxic action of the arsenobenzol drugs may be influenced to some extent by the benzene constituent.

In accordance with these views, Foulerton advocates that a patient going through a course of treatment should be kept under careful medical supervision throughout the period of administration of the drug and for some weeks afterward. Complete abstinence from alcohol should be insisted on, and the diet should be so regulated as to lighten the work of the liver as much as possible. The diet should be the same as that recommended for the prevention of poisoning by trinitrotoluene in munition workers and the treatment of cases in which symptoms of poisoning have already occurred.

The administration of milk or any other fat food in the course of treatment should be minimized. Sugars should be substituted for the fat foods, not only to make up caloric deficit, but also because of the theoretical possibility that oxidation of the excessive floating fat will be favored by its administration [and acidosis be diminished—Ed.]. The diet then, should consist mainly of carbohydrates, with very small quantities of lean meat, or fish—excluding the fatty kinds, herring, mackerel, etc.

Cerebral Reactions Following Injections of Novarsenobenzol. Frederick G. Hitch[7] reports in detail two cases, both of which, about forty-eight hours after intravenous injection of 0.6 gm., developed epileptiform convulsions and coma, terminating fatally. The treatment of these cases on orthodox lines was apparently quite useless. Epinephrine, 1 c.c., was given hypodermically at the outset, and was repeated later with no apparent benefit. The advisability of giving this drug in these epileptiform conditions may be called in question by the experience of Benedek, who gave injections of from 1 to 1.5 c.c. of suprarenal extract to epileptics, and found that seven of these developed a typical seizure from a half to one and a half hours after the injection. At the postmortem examination in each case the most striking naked-eye pathologic change was extreme congestion of the lungs.

The author discards the theory of Milian, attributing the symptoms to the vasodilator effects of the arsenical preparation acting in a patient with diminished suprarenal activity, in favor of the conclusion that the widespread capillary hemorrhages show the symptoms to be due to anoxemia mainly produced by interalveolar hemorrhage into the lungs, and to a less extent by interstitial capillary bleeding into other organs, and that the continuous administration of oxygen offers the best hope of recovery in these unfortunate cases.

Arsphenamine in Non-syphilitic Diseases. Mathew A. Reasoner and Henry J. Nichols[8] conducted an inquiry to determine whether the action of arsphenamine is to be considered as a group effect due to a chemical affinity between the drug and the vital structure of the organisms. It has been given in almost every pathologic condition to which human flesh is heir, but for specific effect, its proper therapeutic field would seem to be limited among non-syphilitic diseases to those caused by spirochetes and in a few instances in lesser degree, to certain protozoal and bacterial infections. Favorable results had been observed in one disease of unknown etiology—rat-bite fever. Later the cause of the

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(7) Lancet, June 19, 1920.
(8) Jour. Amer. Med. Ass'n, Sept. 4, 1920.

disease was found to be a spirochete. An attempt should not be made to carry the group effect theory too far, as there are, apparently, some spirochetal diseases, such as Weil's disease and yellow fever, in which arsphenamine has no beneficial effect.

The authors present the following summary:

For practical therapeutic purposes, the beneficial effects of arsphenamine and neo-arsphenamine are most apparent in a limited number of spirochetal diseases.

They act as a specific in Vincent's angina, relapsing fever, yaws, gangosa and pulmonary spirochetosis (if given early) in man, and in equine influenza.

A therapeutic effect is noted in rat-bite disease, in certain dental conditions and in fowl spirochetosis. The complete measure of the effect in the latter condition has not yet been established.

No apparent benefit has been found in such other spirochetal diseases as Weil's disease and yellow fever.

Good results have been obtained in syphilitics, in a number of non-syphilitic conditions, which are influenced adversely by that disease.

Their use has been recommended in conditions in which arsenic is indicated. In such case the effect is alterative rather than specific, and ordinarily there is no special advantage over liquor potasii arsenitis.

There is a limited effect on certain protozoal diseases, as malaria (tertian and quotidian), some of the trypanosomiases and Leishmaniasis. It is possible, however, that this effect may be non-specific.

With the exception of anthrax, and possibly glanders, few favorable results are reported in bacterial diseases.

Except in Vincent's angina, arsphenamine and neo-arsphenamine should be administered intravenously in medium-sized dosage. Two or three injections usually accomplish the desired purpose, except in pulmonary spirochetosis, which may require a series of injections. In diseases showing liver involvement, it has been recommended that neo-arsphenamine be given on account of its supposed lesser degree of toxicity.

Arsphenamine in Vincent's Angina. F. F. D. Reckord and M. C. Baker[9] emphasize strongly the value

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(9) Jour. Amer. Med. Ass'n, Dec. 11, 1920.

of the use of arsphenamine locally in the form of a 10 per cent. solution in glycerine or, for practical purposes, 0.6 gm. of arsphenamine dissolved in 8 c.c. of glycerine. It does not seem to disintegrate in this way, as when dissolved in sterile water or salt solution and neutralized with sodium hydroxide. One may mix all the powder with the glycerine at one time rather than to dissolve just enough for the particular application. The parts to be treated should be thoroughly cleansed and dried, and then the arsphenamine solution applied by a small cotton swab and the material thoroughly rubbed into the lesions. It is surprising to see the good results obtained by applying this treatment twice a day. It is also indicated in those cases in which the gums are primarily involved and there is infection about the teeth, such as pyorrhea, as the author has found that about 99 per cent. of such cases show fusiform bacilli and spirochetes resembling Vincent's organism. No other treatment has given such good results.

Conditions other than Syphilis Treated by Neoarsphenamine. S. J. Rose[1] believes, as a result of his experience, that wherever Fowler's solution is indicated, neo-arsphenamine is really the ideal arsenical preparation in the majority of cases. It is just as necessary and as markedly indicated, he thinks, in the majority of properly selected cases of chronic blood and skin diseases generally, as it is in specific blood disease.

Administration of Arsphenamine by Rectum. W. M. Wright[2] claims to have cleared up or modified the secondary stages of syphilis and the reaction of the patient's blood to the Wassermann test by the rectal administration of arsphenamine in the form of enteroclysis without the use of mercury or iodides, hence to have proved this to be a satisfactory method for its administration to those who are in need of it and who cannot receive it intravenously.

The basic principle is that the patient should be empty, thirsty, and hungry. In a series of fifty cases the following routine was followed:

"If the administration was to take place at 1:30 p. m.

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(1) Kentucky Med. Jour., May, 1920.
(2) New York Med. Jour., Aug. 28, 1920.

the patients were given a very light supper, one fluid ounce of a saturated solution of magnesium sulphate and one or two compound cathartic pills at 5 or 6 p. m. of the preceding day. The next morning they were denied the regular breakfast, but were given two cups of black coffee and one piece of soft toast. At 7 a. m. they received 1/150 gr. of atropine, at 10 a. m. another, and went to bed where they remained until that evening or next morning. At 1 p. m. they were given one quarter grain of morphine and 1/150 grain atropine hypodermically. During the entire day they were denied liquids, except in some instances a half glass of milk at noon. At 1 p. m. a '1-2-3' enema was given, consisting of magnesium sulphate one ounce, glycerine two ounces and hot water. By this time the condition of the patient was such that the absorption of the enteroclysis by a dried up bowel was an easy matter—this is what we wished to accomplish. At 1 p. m. the enteroclysis was given and continued at a rate of forty-five drops a minute.

''The solutions used varied according to whether salvarsan or arsenobenzol, neo-salvarsan or neo-arsenobenzol was given. If arsenobenzol was used it was prepared as usual and diluted with hot normal saline to from 260 to 320 c.c. and the enteroclysis bag kept hot by hot water bags or electrical appliances. The neo-arsenobenzol was dissolved in 60 c.c. of water at room temperature and diluted to 200 or 260 c.c. with normal saline and required no heat. As stated, the rate of flow was from forty-five to fifty-five drops a minute, and generally required from one and a half to two hours. At first patients were not allowed to eat any supper that night, but later it was found that some could eat a light lunch and experience no after-effects; those who could not went without food. That night they were allowed a few liquids and the following morning they resumed ordinary conditions and diet. The untoward effects have been negligible. The dose varies between 0.6 gram and 0.9 gram.''

Indications for rectal administration are as follows:

1. Fat patients with small or no visible superficial veins.

2. Scrawny patients with poor veins.
3. Children.
4. Women for whom needlemarks in the arm would prove inconvenient in evening dress.
5. Patients with knotted veins from previous intravenous injections.
6. Hysterical and highly nervous types of patients.

Silver-Arsphenamine (Silver-Salvarsan). This new modification of arsphenamine in which the silver enters the molecule in organic combination, has given rise to a large amount of discussion in European medical literature during the past two years. It has been on the market in Germany since the beginning of 1920; and has just entered the market of the United States. It will therefore be of interest to note here the salient facts in connection with this probably important new remedy.

Extensive systematic animal experiments carried out by Kolle at the Frankfurth Institute for Experimental Therapy and following in the footsteps of Ehrlich, have demonstrated that this new compound has greater therapeutic activity, a lower toxicity and better solubility than the old salvarsan or neosalvarsan. This preparation which bears the serial number 1495, has shown itself by far the most efficient remedy yet tested against animal infection with the spirochete of recurrent fever.

The therapeutic effects of silver-salvarsan against syphilis seem to coincide with the expectations that the animal experiments awakened. Primary, secondary and tertiary syphilitic manifestations are clinically cured with remarkable rapidity, though it is believed that the Wassermann reaction is less rapidly influenced than with neosalvarsan. In paresis, especially rapid and favorable changes have been noted in the pathology of the cerebrospinal fluid.

E. Nathan and E. Flehme[1] have used this compound approximately 15,000 times on about 1,000 patients. The doses varied from 0.05 to 0.30 and were given by them intravenously, freshly dissolved in 15 to 20 c.c. of distilled water, by means of a glass syringe. [Even more concentrated solution such as 0.2 gm. to 5.0 c.c. of water and 0.3 gm. to 7.0 c.c. of water have been employed.—Ed.]

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(1) Therap. Halbmonatsh., Nov. 1, 1920.

It is important to note the color and solubility of the preparation, as altered specimens should be rejected. Silver-salvarsan should float on the surface of the water used for its solution, and dissolve rapidly yielding an ichthyol-brown fluid. Preparations that form lumps, that sink to the bottom, or that dissolve with grayish black or reddish color, or the solutions of which are not clear and transparent, must not be injected.

In florid syphilis the authors commence with 0.05 gm. to avoid violent reaction. Two days later they inject 0.1 gm.; three days later, 0.2 gm. and four days later 0.3 gm. of the remedy. If these injections are well borne, they now give 0.3 gm. silversalvarsan every 4th or 5th day until a total of 3 to 4 gm. silver-salvarsan have been given. Even with such doses some cases (19.7 per cent.), do not become Wassermann-negative. On the other hand, the clinical phenomena of syphilis are undoubtedly more rapidly removed than by means of neosalvarsan. Another fact that points to the rapid and intense influence of this new preparation upon florid syphilis is the comparatively frequent appearance of Herxheimer reactions 12 to 24 hours after the injection, especially in the form of macular and other eruptions.

In general, silver-salvarsan is well tolerated by the great majority of patients, men and women alike, and in ambulatory cases as well. The authors have the impression that undesirable side-effects are more common in the warm, rather than the cooler part of the year. They have noted the following untoward manifestations.

1. Fever, evidently spirochetal fever, which occurs rather commonly especially in early florid syphilis, and after 0.1 gm. dose. Hence, the authors advise the use of 0.05 gm. as the first injection in early syphilis. In latent and old cases, even the first injection is well tolerated as a rule. If the fever occurs after a number of reactions tolerated without rise in temperature, it is best to reduce the dose of the silver-salvarsan and then to increase it very gradually giving the doses at longer intervals.

2. Vomiting and other gastric disturbances have been noted; but very rarely.

3. Angioneurotic symptoms occur but rarely and

chiefly in women; and these manifestations could, in nearly every case, be prevented by administration of 1 to 2 mg. of epinephrine ten minutes before the treatment. Some patients complained of palpitation, which was sometimes accompanied by considerable tachycardia. All of these soon disappear.

4. Headache, occurring soon after the injection and lasting for a day or so, was complained of by some patients but was never very severe. Occasionally depression and sleepiness were noted on the day of the injection.

5. Icterus occurred in only two cases and even then it was probably merely catarrhal jaundice, as continuance of the treatment after 14 days was tolerated without reaction.

6. Skin eruptions were observed in twelve cases; they were quite independent of the size of the dose or frequency of injections. For instance, a general erythemia occurred after the first injection of 0.5 gm. of silver-salvarsan, after the disappearance of which, further injections were tolerated without any reaction.

The authors have no deaths to record. They report in detail four cases of neurorecitiva, in some of which, rather severe phenomena manifested themselves.

Sulphoxylate-Salvarsan. E. Nathan and E. Flehme[2] report experiments with about 3,000 injections of this new arsenical compound, which, in contrast to the rapidly and intensely acting silver-salvarsan, is slower but more lasting in its effects. An interesting evidence of the slowness of its action is the appearance, in two cases after 0.2 gm. of sulphoxylate-salvarsan of Herxheimer reactions on the fourth day after injection. The dose of this compound is somewhat higher than that of silver-salvarsan. It may be given up to a maximal single dose of 0.4 gm. and a total of 4 to 5 gm. This remedy seems to have a specific value in cases of old syphilitics, the positive Wassermann reaction of which, had not yielded to other treatment; for in several such cases the authors have succeeded in rendering them Wassermann-negative by means of a course of this new modification of salvarsan.

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(2) Therap. Halbmonatsh., Nov. 1, 1920.

MERCURY

The Germicidal Value of Potassium Mercuric Iodide. Douglas Macfarlan[3] reports on the advantages of this substance over other iodine and mercury salts. This distinct chemical entity formed by the direct combination of two molecules of potassium iodide with one molecule of mercuric iodide must contain an excess of potassium iodide to preserve it. It may be obtained in tablet form, in which the two salts are bound by an inert soluble excipient and readily yield clear, stable solutions of the double salt. This is by far the most convenient form in which to obtain and employ this substance. Macfarlan enumerates its advantages as follows:

1. *Solubility:* It is readily soluble in both water and alcohol, as well as in acetone.

2. *Toxicity:* It is far less toxic than mercuric chloride; and, in dilutions effective for germicidal use, the factor of safety renders it comparatively harmless for irrigation of mucous membranes, or for any purpose in which there is a likelihood of its being swallowed. Even a 1 per cent. solution may be taken internally in doses of from six to eight drops without producing gastric irritability, while one would have to swallow about 30 c.c. of the 1 to 1000 solution, or 300 c.c. of the 1 to 10,000 solution to obtain the maximum medicinal dose.

3. *Lack of Irritation:* One-half of 1 per cent. solution is slightly irritating to mucous membranes, causing a burning sensation and watery secretion. Solutions of these strengths have little or no irritating effect on the skin when applied for twenty-four hours by a wet pack or compress, while dilutions of 1 to 1000 or more cause none of the disagreeable effects upon the hands produced by similar solutions of bichloride of mercury.

4. *Non-precipitation of Proteins:* Contrary to the action of other metallic germicides, in the presence of proteins, potassium mercuric iodide fails to precipitate these substances. So soluble is this salt in protein solutions that human blood serum readily dissolves 100 per cent.

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(3) Amer. Jour. Med. Sci., April, 1920.

of potassium mercuric iodide without appreciable coagulation or precipitation of the serum albumin or globulins. The germicidal action of the double salt, unlike other antiseptics and germicides, is only slightly diminished by the presence of organic matter.

5. *Germicidal Action:* The author's experiments, which are in agreement with those of others, prove that potassium mercuric iodide possesses a remarkably high germicidal efficiency. Staphylococcus is killed in five minutes by a 1 to 5000 solution, a dilution incapable of producing irritation to the most sensitive tissues or of causing poisoning under the usual therapeutic conditions. Human serum albumin, in a concentration of 0.5 per cent., has no appreciable effect on the germicidal action of 1 to 500 and 1 to 1000 solutions of potassium mercuric iodide. This double salt may therefore be recommended as the most desirable of the inorganic germicides.

Mercury Salicylate Suspension. F. W. Nitardy[4] suggests suspending powders in an oily or fatty vehicle, by emulsification of the vehicle, which makes a practically permanent suspension possible. In other words, the suspension of water in oil or oil in water acts as an effective barrier to the settling out of a finely divided solid, even though the latter be quite heavy. If powdered mercuric salicylate be triturated with almond oil so that each cubic centimeter of the mixture will contain 0.13 gm. of the drug, settling becomes evident immediately on standing. If the same mixture is made, except replacing a portion of the oil with anhydrous lanolin and water representing 20 and 5 per cent. of the finished volume respectively, no settling of the powder is noticeable, even on standing several weeks or even months. The small amount of oil separating at the top is easily incorporated by shaking. The emulsion could be so adjusted that no oil will separate from it.

Calomel Inunctions Inefficient. H. N. Cole and Sidney Littman[5] on the strength of the recommendations of Wile and Elliott and Schamberg, Kolmer, Raiziss, and

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(4) Jour. Amer. Pharm. Ass'n, November, 1919.
(5) Jour. Amer. Med. Ass'n, Nov. 8, 1919.

Gavron[6] employed the following ointment for inunction purposes:

	Gm.
Hydrargyri chloridi mitis	3
Adipis lanae hydrosi	1
Adipis benzoinati	2

As a result of the study of a series of fifty-four cases, these authors find that calomel inunctions are almost totally inefficient against primary and secondary syphilis. They very rarely produce salivation or gingivitis, because of poor absorption. Calomel rubs may occasionally produce a dermatitis. Hence, Cole and Littman strongly advise against their further use in the treatment of syphilis.

Mercuric Bichloride Intravenously. Carl H. Bastron[7] is the author of this article.

Technique: The mercuric bichloride is dissolved in normal salt solution, so that 10 c.c. of the solution contains 0.06 of the drug. The bichloride solution may be kept in a glass-stoppered bottle or it may be distributed in ampoules in amounts of 1, 2, 3, 4 and 5 c.c. each. Treatment is begun with 1 c.c. of the solution, which contains 0,006 gm. of mercuric bichloride. A fine, long, platinum needle is employed for injection; and, when the needle is withdrawn, the solution is hastened through the vein by the patient raising his arm over his head and alternately closing and opening his fist, thereby lessening liability to thrombosis. An important precaution is that the needle should enter the vein, and its point lie free in the lumen of the vein before injection is begun. This is to avoid injecting the drug outside the vein or into its wall, thus guarding against the chief objection to this method, namely, pain at the site of injection and occlusion of the vein by a thrombus. Another precaution is that of using a dilute solution of mercuric bichloride. Concentrated solutions often cause a spasmodic contraction of the wall of the injected vein and a permanent occlusion of its lumen. A further precaution to be observed is the use of a small needle; a one-inch gauge 25

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(6) Practical Medicine Series, 1917, Vol. VIII, p. 67, and 1918, Vol. VI, p. 58.

(7) Amer. Jour. Med. Sci., July, 1920.

platinum needle serves the purpose well. A large needle causes more pain, enters the vein with more difficulty and causes more injury to the vein. One more precaution: Treatment should be begun with a small dose, not over 0.006 gm. of the drug, and the increase should be gradual and cautious. The injections can be given as often as once a day, but an injection every other day or three times a week is safer. This is continued until signs of mercurialism appear, when the injections are reduced to one or two a week.

The author employs the following routine in cases of syphilis: He gives the mercury bichloride injections three times a week, starting with 0.006 gm. giving from 0.009 gm. to 0.012 gm. the second dose, from 0.012 gm. to 0.015 gm. the third, and 0.018 gm. the fourth. In the case of a strong man the dose thus can be gradually increased to 0.030 gm. As soon as signs of saturation appear, usually a slight soreness in the teeth when the jaws are shut with a snap, it is considered that the maximum dose for that patient has been reached and treatments are then given once or twice a week. Treatments are persisted in for at least six weeks; longer, if the Wassermann reaction remains positive. When a patient has developed salivation his tolerance for the drug after symptoms of salivation have disappeared, is increased, and the treatment can be resumed where left off without fear of salivation.

That mercury bichloride is exceedingly toxic and corrosive is well known, and it could not be used intravenously if it were not instantly converted into a noncorrosive compound. While the kidney seems to suffer most commonly in mercury poisoning, the author has not observed, so far, any kidney lesion that could be attributed to the effects of mercury bichloride. In fact, several cases that presented, besides syphilis, mild degrees of nephritis, pyelitis and cystitis, promptly cleared up under intravenous mercury bichloride injections.

The one serious drawback to the intravenous injection of mercury is the frequent occurrence of thrombosis in the injected veins. Hence, Bastron hesitates to advocate its adoption by the profession as a routine practice. But in cases in which quick results count for more than the local discomfort and slight chance of embolism, this method finds a proper place of application.

Sulphur as a Prophylactic of Mercurialism. G. Irving[8] reports that administering one teaspoonful of sublimed sulphur, nightly (by mouth) has given astounding results in connection with intramuscular injections of mercury for syphilis, not only in the prevention of mercurialism, but also in securing rapid improvement of those who were suffering from this condition. Since using this method, Irving has dispensed with all special care of the mouth except the advice to "wash teeth after meals."

This is in agreement with Gaucher's recommendation of sulphurous waters in the prevention of mercurialism, and his theory that mercuric sulphide is better tolerated than the form in which it otherwise circulates in the system.

[It is also in line with J. H. Wilms' use of calcium sulphide as antidote for mercuric chloride poisonings.[9]—Ed.]

On the other hand, the results reported oppose the theory that the damage is produced by union of the mercur-ions circulating in the blood with sulphurated hydrogen developing from putrefaction of food particles retained in the recesses of the mouth (Almkvist's explanation).

"Mercurochrome-220" in the Genito-Urinary Tract. Hugh H. Young, E. C. White, and E. O. Swartz[1] have carried on extensive research work to develop an antiseptic applicable to the genito-urinary tract. Impressed with the possibilities of using dyes, as a basis for therapeutic compounds, they concentrated their efforts in this direction.

The basic dyes such as fuchsin, brilliant green, crystal violet and, in some cases, the flavines, are too irritating to the mucosa of the urinary tract, because they are salts of weaker bases, and therefore their solution must have an acid reaction. The acid dyes, on the other hand, are used as sodium salts, and solutions of them neces-

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(8) Brit. Med. Jour., Jan. 31, 1920.
(9) Practical Medicine Series, 1917, Vol. VIII, p. 178.
(1) Jour. Amer. Med. Ass'n, Nov. 15, 1919.

sarily have a neutral or slightly alkaline reaction, which is well borne by the tissues. This reasoning led to the choice of an acid dye as the basis of the synthetic germicide.

Mercury was chosen as the active germicidal principle to be substituted in the dye molecule so that it no longer yields ions, but exists as a firmly bound part of the dye molecule itself. The result of the work is "mercurochrome-220," which contains about 26 per cent. of mercury. Its sodium salt forms iridescent green scales, slightly hydroscopic and readily soluble in water. The solution is stable and is not affected by moderate heat or exposure to the air. Strongly acid urine (ρ_H=5.0) gives a slight precipitate *of the free dye;* but, if the acidity is ρ_H=6.4 or less, no precipitation occurs. There is entire freedom from precipitation when a 1 per cent. solution of the drug is mixed with an equal volume of medium rich in protein, such as hydrocele fluid. The solution stains the skin a bright red color, but the stain is readily removed by rubbing first with 2 per cent. potassium permanganate solution, and then with 2 per cent. oxalic acid solution.

Experiments show that the preparation penetrates through the epithelial cells of the urethra which are stained a deep red. This mercury bearing dye not only stains the epithelium of the urinary mucosa, but to a less extent penetrates to the submucous layers, as is demonstrated by sections of the bladder and the ureter which show uniform penetration and staining of the cytoplasm of the epithelial cells, while the submucosa is less deeply stained. Sections of the kidney pelvis showed penetration and staining of the surface epithelium. The dye was also taken up by the cells of the collecting tubules, which were stained for a short distance up the tubules from the papillae. In the urethra, the epithelium of the glands opening into the urethra was stained for some distance from the mouths of the ducts.

That the toxicity of mercurochrome is not great is shown by the fact that dogs tolerated 10 mg. per kilogram very well with no evidence of discomfort or illness, though in each instance there was produced an albuminuria without casts and a temporary reduction in phenolsulphonephthalein output, but no rise in blood urea. The albuminuria persisted about five days. At no time were casts found. With this toxic limit established, no harm is to be expected from the small amount of the drug that may be absorbed when used locally in the genito-urinary tract.

The irritant action is very slight. One per cent. solutions of mercurochrome-220 gave no evidence of irritating qualities when used in the conjunctival sac of rabbits. Solutions of this drug in strength from 0.1 to 5 per cent. have been used in the human genito-urinary tract without harm. In the kidney pelvis, a 1 per cent. solution was used. In the urethra a 5 per cent. solution caused only temporary burning when retained five minutes. A number of cases of acute urethritis have been treated by the use of 1 per cent. solution injected four times a day, the solution being retained five minutes at each injection. There has been no irritation beyond occasional temporary smarting. A 1 per cent. solution is retained by the human bladder for from 1 to 2 hours without irritation. In one case, 1 ounce of 1 per cent. mercurochrome was placed in the bladder and retained until the next catheterization, about six hours later. This man complained of severe burning in the bladder and had a reaction which persisted for several days, after which the urine became much clearer, but his infection persisted.

That mercurochrome-220 is a drug of great germicidal value is shown by the fact that a solution of about 1:1,000 kills *B. coli and Staphylococcus aureus* in urine in one minute. It has practically fifty times the germicidal strength of acriflavine in urine medium for exposure of one hour. Rapid sterilization has been accomplished in a series of cases of cystitis and pyelitis of long standing and refractory to other treatments. Now for the first time we have a method of quickly curing certain chronic infections of the bladder. The rapidity with which a few cases of old purulent cystitis disappeared was surprising; they became free of pus and bacteria in a few days.

Mercurochrome-220 has also proved to be eminently satisfactory in the treatment of chancroids and as a dressing for buboes after incision. In these cases it was found convenient to use a starch paste containing 5 per cent. mercurochrome-220 by weight, instead of a solution, the sore being dressed with this once a day.

Mercurochrome-220 in Ophthalmology. W. B. Lancaster, F. L. Burnett, and K. H. Gaus[2] have used this compound of fluorescein and mercury. In acute infections of the conjunctiva from one to several drops of a 1 to 2 per cent. solution were instilled from three to ten times a day. This caused a more rapid reduction of discharge than zinc sulphate, boric acid, argyrol, or mercuric chloride. A conjunctivitis following an operation on the eyeball responds to mercurochrome-220 more promptly than to any other treatment. In ulcers, the drug shows by its staining quality that it penetrates the infiltrated zone. The author quotes four cases of pneumococcus ulcer with hypopyon satisfactorily treated by use of the actual cautery to destroy all infiltrated tissue, with or without perforation according to circumstances (but perforating if in doubt) followed by mercurochrome, 2 per cent. every hour while the patient is awake and three times at night, the eye being kept bandaged between treatments, preferably with a Liebreich tie-bandage, and with hot applications several times a day. Mercurochrome is very much more penetrating than optochin, if one may judge from appearances, and a 1 or 2 per cent. solution is not so detrimental to the tissue cells as to retard reparative activity.

A study of 427 selected cases from the records of the Massachusetts Charitable Eye and Ear Infirmary demonstrates that in ophthalmia neonatorum it *does* make a difference what drug is used. Thus, with twenty cases treated with zinc sulphate, the stay in the hospital was five weeks; with fifteen cases treated with mercurochrome (5 to 10 per cent. solution), the stay was 3⅓ weeks.

A solution of 2 per cent. mercurochrome applied freely (about five drops) to the conjunctival sac, from five to ten minutes before cataract and other operations, has proved itself a satisfactory preparative disinfectant procedure.

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(2) Jour. Amer. Med. Ass'n, Sept. 11, 1920.

QUININE GROUP

Quinine Formula for Treatment of Malarial Fever. Bruce Mayne[3] offers the following course of treatment with a full realization of its inapplicability to special and complicated cases and the warning to the lay patient that it is not recommended for self-medication without professional consultation.

''The course of treatment provides for the application of a minimum of seventy-five days in the administration of 800 grains of quinine bisulphate.

''The formula is elaborated in a geometric progression, consisting of four courses of 200 grains each. A scheme of the formula is outlined in Figure 6. An analysis of the formula follows:''

Forty grains daily for five days: Ten grains of quinine bisulphate should be given four times daily. At the end of this period there should be no severe paroxysms, no chills, and only young rings and mature gametocytes in the blood.

2. *Twenty grains daily for ten days:* About the middle of this stage the patient should probably be out of bed, and clinically and apparently normal; fevers and chills probably absent. With the exception of gametocytes, parasites will not be demonstrable microscopically.

3. *Ten grains for twenty days:* Arsenic (Fowler's) or other tonic may be prescribed, if indicated. Only gametocytes remain in the microscopic examination. The patient should be on duty or able to resume normal activities, if necessary.

4. *Five grains for forty days:* In this stage, not the least important, a 5 grain capsule of quinine bisulphate or its equivalent should be taken with a tonic accompaniment if indicated. This stage is marked by the apparent recovery of the patient. At this juncture a continuance of treatment should be strongly urged, especially in benign types of malaria, for a period of two weeks or more. By this time a microscopic examination reveals only rapidly disappearing or disintegrating gametocytes which may be considered potentially

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(3) Jour. Amer. Med. Ass'n, Oct. 11, 1919.

negligible. The sexual forms of tertian and quartan parasites are not demonstrable at this stage.

The most essential point to be made is the consideration of the chronicity of this insidious disease. The average patient cannot be induced to take sufficient quinine for a long enough period to effect a cure, or at least to prevent a relapse in a reasonable time. It has been shown by some experiments conducted at a government hospital that in every instance in which the period of treatment was less than two and a half months there followed a relapse. Hence, the duration of treatment advised, which might possibly with advantage be extended to a period of ninety days.

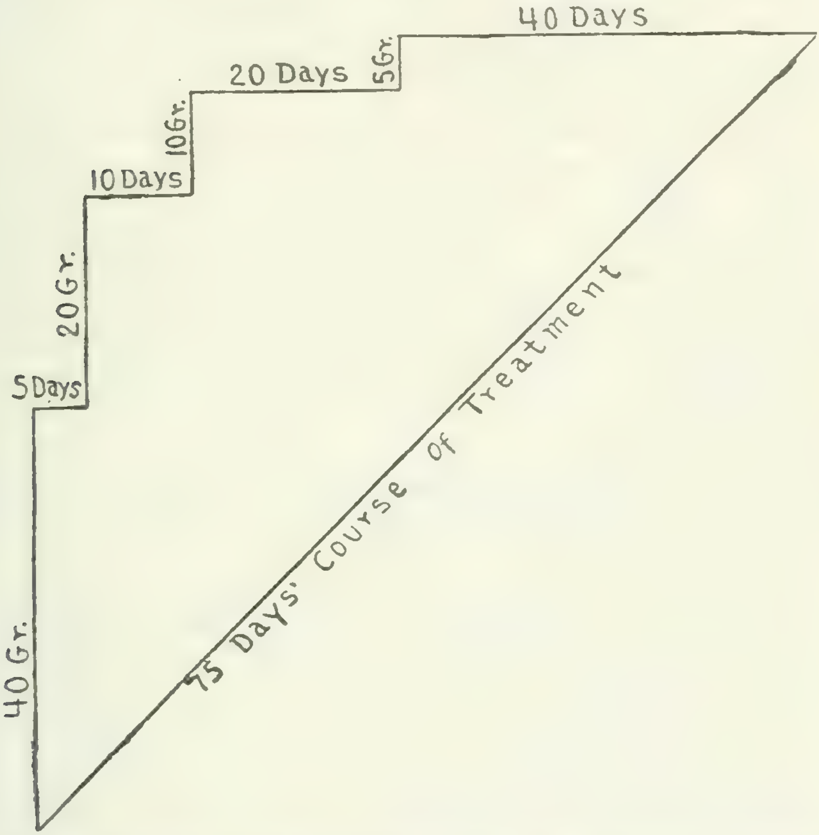

Fig. 6. Scheme of course of treatment; four courses of 200 grains over period of seventy-five days.

Quinine in Treatment of Hemoptysis. Joseph E. Stroebel[4] claims to have obtained favorable results in hemoptysis from the administration to patients, coming to the sanitarium with history of recent hemorrhage or blood spitting, of quinine every four hours in 0.30 gm. doses for one week. The symptom seldom recurs. Patients who have hemorrhages are given the same dose but at shorter intervals. The patient is placed on liquid diet and kept in bed. The author believes that the drug acts by antagonizing the secondary infection responsible for the hemoptysis.

Gelatine as Vehicle for Subcutaneous Injection of Quinine. The use of 10 per cent. carefully sterilized gelatine solution as a vehicle for quinine hydrochloride is advocated by M. Klotz[5] in order to avoid the necroses which occur with considerable frequency when the same salt is given in aqueous medium. He advises against exceeding a proportion or dose of 0.25 gm. in one c.c. of gelatine solution, which should be boiled energetically for several minutes, in order to sterilize it. Sterilized gelatine, especially prepared for injection, only should be used (otherwise there is danger of tetanus). The injection is best made into the gluteal muscles.

Optochin in Pneumococcus Meningitis. A case of pneumococcus meningitis, in which prompt improvement and recovery occurred after intrathecal injection of 20 c.c. of warm sterile solution of optochin 1 to 500, following the removal of 20 to 30 c.c. of cerebrospinal fluid is reported by Rosenow.[6] This injection might be repeated, if necessary, after one or two days. Combination with subcutaneous administration of optochin might be advantageous. Success, of course, can only be expected in early cases.

The New Quinine Derivatives—Vuzin and Eukupin—as Antiseptics. Among the Germans during the war, vuzin and eukupin antisepsis seems to have played the rôle that the Carrell-Dakin treatment, Bipp, and flavine therapy have played among the allies; thus a review

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(4) Med. Record, Aug. 21, 1920.
(5) Therap. Halbmonatsh., March 1, 1920.
(6) Deutsch. med. Wochensch., 1920; ref. Therap. Halbmonatsh., June 1, 1920.

article by Carl Bruhn[7] gives eighty-two references in recent literature.

These substances have been produced by Morgenroth by substitution of various alcohol radicals in the hydroxyl side-chain of the chinolin nucleus of hydrocuprein, a quinine derivative. The following table from Morganroth's laboratory shows the relative disinfectant value of these agents, as compared with others better known, upon streptococci and staphylococci *in vitro* at incubator temperature and after twenty-four hours exposure.

Lysol	1:800
Phenol	1:800
Corrosive sublimate	1:2,500
Quinine	1:1-4,000
Methylhydrocuprein (Hydroquinine)	1:4-6,000
Ethylhydrocuprein (Optochin)	1:2-8,000
Isoamylhydrocuprein (Eukupin)	1:20-40,000
Isoktylhydrocuprein (Vuzin)	1:40-80,000
Decylhydrocuprein	1:10-20,000

These quinine derivatives are bacteriostatic in one-half to one-fourth the above concentrations; they are still active in form of their nearly water insoluble bases, and in moderately albuminous fluids.

Besides streptococci and staphylococci the following organisms are also similarly affected: diphtheria, gas gangrene and tetanus. Much more resistant are the cholera vibrios; and still more resistant are typhoid, paratyphoid, coli, dysentery, pyocyaneous, and the Friedländer bacilli, some of which are capable of growing in 0.1 per cent. solution of these quinine derivatives. Their disinfectant power is therefore markedly specific, as has previously been shown by the specific action of optochin against the pneumococcus.

The neurotropic action of the quinine derivatives is shown by their anesthetic power, which is slow in onset, but characterized by a remarkable duration. Of practical importance, furthermore, is the fact that oily solutions of the bases are still capable of producing anesthesia. The anesthetic action proves that penetration

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(7) Therap. Monatsh., December, 1919.

of tissue occurs, a question of great importance in connection with antiseptics.

Irrigation, compresses, and tampons having proved themselves of no special merit for the application of these agents, Klapp (1917) undertook infiltration of the wound area with solutions of 1:5,000 to 1:10,000 in normal saline. The solutions were either prepared by means of heat or by dilution of a 10 per cent. alcoholic stock solution. To these solutions it is of advantage to add from 0.25 to 0.5 per cent. procaine, which removes the primary painfulness of the injection, the anesthetic effect of which appears later, as well as permitting the necessary surgical treatment of the wound. The addition of epinephrine is also advantageous as it lessens the rapidity of absorption and with it increases the local action. For similar purpose the addition of 3 per cent. acacia has been suggested. Solutions have also been introduced by means of intravenous injection, similarly to Bier's method of vein anesthesia, the affected member being freed from blood, constricted distally, and the solution injected slowly into the vein in a peripheral direction. Intra-arterial injection has likewise been suggested. As much as 800 c.c. of 1:5,000 vuzin has been used without marked local reaction. A 1:1,000 solution is only used where, as in the finger, the quantity that can be injected is small. The effect of these injections, the author states, showed itself particularly in a marked diminution of pus formation due to the antileukotactic action of quinine, the agglutination of the wound margins was slowed, and the formation of granulations somewhat delayed; all of which was of no disadvantage, as healing by first intention could usually be secured. In wounds thus treated, gas gangrene occurred very rarely. Some surgeons consider liberal infiltration with 1 per cent. eukupin combined with thorough wound excision a certain preventive of gas gangrene provided it is used early enough.

Another method of using these antiseptics is by injection into cavities. Thus, in joint injuries, after the wound was surgically cleaned and rinsed with vuzin solution, it was closed and the joint cavity left was filled with 1 per cent. solution by puncture from a sound portion, and immobilized. When pain and temperature made the appearance of joint infection manifest, repeated puncture, irrigation, and filling of the joint became necessary. In severe abdominal wounds, as much as 750 c.c. of 1:15,000 vuzin was left in the peritoneal cavity, after the usual surgical procedures, with three satisfactory recoveries among five cases. Suppurating cavities, even empyemas, were successfully treated with puncture, irrigation, and injection, though two or more treatments were usually required. The result of such treatments was a considerable increase in the local inflammatory manifestations and often a rise in temperature; but the pain disappeared soon, the next day the inflammatory reaction subsided, and a cold abscess resulted. After from one to three further punctures, the fluid became serous and diminished, until finally healing with hardly visible punctiform scar occurred. Even tuberculous abscesses have reacted in this manner.

Used in 1 per cent. solution, eukupin has proved itself successful in freeing diphtheria carriers from pathogenic organisms, when applied as a pigment to the tonsils, with special attention to the crypts. The nose is irrigated with such a solution, or filled with tampons medicated with 1 to 2 per cent. eukupin ointment. In addition, patients were given from 6 to 10 bonbons daily containing from 0.015 to 0.020 gm. eukupin. Success was obtained, on an average, in from one to two weeks. A 5 per cent. alcoholic solution has been painted on diphtheritic membrane every two or three hours with asserted good results in diphtheria; in addition, of course, to the usual serum treatment. Meningococcus carriers have been freed from meningococci within four days as a rule by daily irrigation of the nasopharynx with 0.5 per cent. aqueous solution of eukupin dihydrochloride. In ozena, 2 and later 3 per cent. ointment of eukupin dihydrochloride has succeeded in making patients completely symptomless after 20-30 treatments. To lessen the tendency to sneezing, it is well to add an anesthetic applied by means of a tampon which fills the nasal cavity completely for from 20 to 30 minutes, after thorough removal of crusts. Relapses occurring in course of time yield more readily.

Eukupin, in doses of 0.5 gm. to 1.0 gm. daily, freed the blood of malaria patients from parasites in a short time. It is claimed that 3.0 gm. of eukupin taken in divided doses reduced the mortality of influenza pneumonia to one-half. Intravenous injections of from 10 to 20 or 30 c.c. of 1 per cent. vuzin solution have not prevented death in cases of puerperal sepsis.

EMETINE

Intestinal Ipecac Preparations. These preparations were studied by Torald Sollman[1] with the following results:

Emetine bismuth iodide is only slightly soluble in fluids of the acidity of the stomach, but is freely soluble in fluids of the alkalinity of the intestine. These findings agree with clinical data, namely, that it is an effective amebicide, but is not altogether devoid of gastro-intestinal irritation. The alkaloids of alcresta ipecac, on the other hand, are entirely insoluble, both in acid and alkaline solutions of physiologic concentration. The solubility is not improved by the addition of bile salts or of albumin. The pharmacologic literature of alcresta ipecac confirms the statement that the emetine remains entirely inactive.

Intestinal Extraction of Adsorbed Alkaloids. G. H. A. Clowes and A. L. Walters[2] have set themselves the task of determining whether or not alkaloids adsorbed on Lloyd's reagent, a variety of fuller's earth, are extracted from their adsorption compounds in the intestinal tract and thus rendered therapeutically available. The use of the adsorption compound of the ipecac alkaloids for therapeutic purposes depends upon the fact that alkaloids are actively adsorbed from acid aqueous solutions by means of fuller's earth, and liberated by ammoniacal chloroform. Since stomach contents are acid, the emetic effect following oral administration of the ipecac alkaloids is avoided. Many times the emetic dose of the alkaloids may be taken in this form without producing either vomiting or nausea. The question is whether

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(1) Jour. Amer. Med. Ass'n, Oct. 11, 1919.
(2) Ibid., Sept. 4, 1920.

these compounds are sufficiently soluble in the intestine to be of therapeutic value.

The authors point out that Sollman's test-tube experiments (discussed in preceding abstract) can not settle the question, and that the therapeutic effects following the use of this preparation noted by various investigators in dysentery and subsequently in pyorrhea, and the diarrhea induced by too large a dose of the adsorbed ipecac alkaloids, afford at least presumptive evidence of their release in the intestinal tract. The problem can only be solved by animal experimentation.

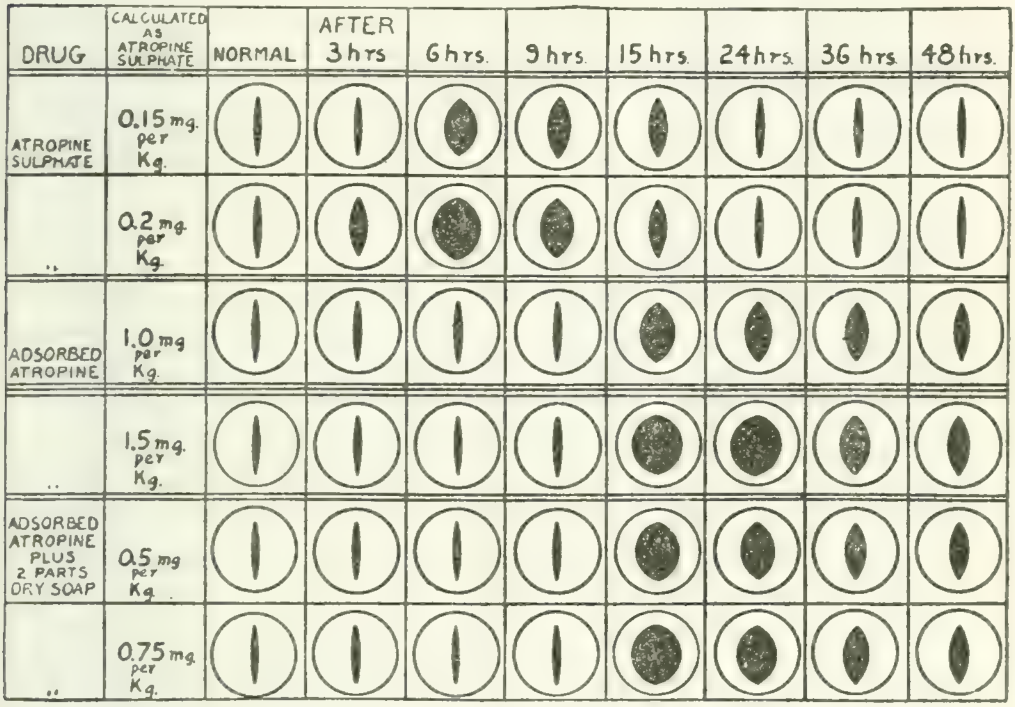

Fig. 7. Mydriatic effect of atropine given orally to a cat.

Adsorbed atropine given to cats by mouth, causes full dilatation of the pupils with failure of reaction to light. Approximately seven times as much adsorbed atropine as free atropine is required in order to produce mydriasis. The adsorbed atropine exerts its effect less rapidly; the effect, however, is more uniform and lasts much longer. It is interesting to note that the amount of adsorbed atropine required to produce mydriasis is lowered 50 per cent. if a small amount of neutral soap be given with the adsorbed atropine when administered orally. The accompanying diagram (Fig. 7) illustrates the extent to which dilatation of the pupil is maintained when subjected to bright light. From these experiments it is apparent that the adsorption compound gives up a sufficient proportion of alkaloid to the intestinal mucosa to produce full dilatation of the pupil with complete failure to react to strong light.

The adsorbed strychnine induced typical strychnine effects, when administered orally to rabbits, the minimum lethal dose representing 20 mg. strychnine sulphate per kilogram of rabbit. It was found that the adsorbed strychnine in this preparation possesses about one-eleventh of the toxicity of free strychnine, and that, as in the case of atropine, when dry soap is given at the same time the toxicity is doubled.

When adsorbed strychnine was introduced directly into the peritoneal cavities of rats these exhibited typical strychnine symptoms and died in two or three hours. The dose required being, of course, considerably larger. Hence it may be concluded that alkalinity is not necessary for cellular extraction of strychnine from its adsorption compound.

An adsorbed quinine preparation was administered orally to dogs and the amount excreted in the urine determined with as much accuracy as possible. Quinine sulphate was given orally to the same dogs for control purposes. It was found that the alkaloid is extracted from its adsorption compound and is excreted in amounts comparable to those following the administration of quinine sulphate.

When alcresta tablets of ipecac are administered orally to dogs in fairly large doses, a diarrhea is produced which affords evidence that some of the alkaloid is released in the intestinal tract, since Lloyd's reagent alone is not a laxative. Furthermore, following oral administration of as small a dose as 2 grains of adsorbed emetine, the alkaloid may readily be detected in the urine. While large doses of 3.6 per cent. alcresta ipecac may be administered to cats without causing emesis, on addition of soap or even fatty acid, considerably smaller doses of the adsorbed alkaloid cause vomiting.

It was found that soap also facilitates extraction *in vitro.* Quinine was most readily extracted by means of soap, and atropine, strychnine and emetine less readily; but in all cases the yield of alkaloid was considerable. Hence, the theory is advanced that soaps, fatty acids, lipoids, etc., present in or near the surface of the cell protoplasm facilitates a direct extraction of the alkaloid from the Lloyd's reagent and that the experimental data presented afford substantial evidence that the alkaloids, atropine, quinine, strychnine, and emetine adsorbed on Lloyd's reagent, are extracted in the intestinal tract and thus rendered therapeutically available.

[The findings agree with mine published in 1915, as a result of which I concluded that fuller's earth has but slight antidotal value for alkaloids, though it had more value against some (morphine, cocaine, nicotine, and ipecac) than against others. The question that still remains to be settled by extensive clinical investigation is whether adsorbed ipecac alkaloids are extracted in sufficient quantity and sufficiently rapidly to produce therapeutic results comparable with those of other intestinal preparations, such as emetine and bismuth iodide, and whether any of these are as efficient therapeutically as the hypodermic administration of emetine or of the native drug.—Ed.]

Emetine Bismuthous Iodide Administration. T. J. G. Mayer[3] finds mutton fat an excellent vehicle for the administration of this drug. By making pills with mutton fat as an excipient and covering each with a layer of the melted fat applied with a paint brush, they may be conveyed practically undigested through the stomach, thus avoiding regurgitation, vomiting, or even nausea. That the drug is altered in the intestine is shown by the darkening of feces, and the fact that cases of dysentery were cured by means of such pills.

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(3) Jour. Trop. Med. and Hyg., May, 1920.

SALICYLATE GROUP

Destruction of Salicylate. P. J. Hanzlik and N. C. Wetzel[4] find that an aqueous solution of sodium salicylate deteriorates on standing, the loss being greater with weaker solutions. The destruction is due to living matter, chiefly fungi; for solutions containing a preservative, such as chloroform, do not deteriorate. Salicylate is also destroyed by yeast, as well as by hashed animal organs. The authors found no difference between the action of liver and of other organs in this respect.

About 20 per cent. of salicylate administered to normal human beings is destroyed. In cats and dogs, the destruction is even greater, amounting to about one-half of the salicylate administered. Destruction of salicylate is markedly increased (to about 40 per cent.) in febrile conditions of man, in drug habitues (alcohol and morphine), in nephritis, and in Basedow's disease. This increased capacity for destruction may be ascribed to the general increase in katabolism of fever and of Basedow's disease; and to retention with prolonged exposure to destructive action of the tissues in nephritis. The destruction does not appear to be a special function of a certain organ such as the liver, since the excretion in liver disease in man and in hepatic degeneration in animals was within normal range.

The excretion of salicylate after administration of methyl salicylate (oil of wintergreen), is much less than after sodium salicylate. After gastric administration the free ester was found in the urine in concentrations of from 0.2 to 0.52 per cent.; and, in considerably greater percentage after intramuscular injection. This passage of unchanged methyl salicylate through the system accounts for its greater analgesic properties and toxicity, and suggests a possibility of urinary and even systemic antisepsis.

Salicylic Acid in Ringworm of the Nails. Robert Craik[5] reports two cases proved to be of this nature by examination of scrapings showing hyphal fragments, and cured by a lotion of 4.0 gm. of salicylic acid in

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(4) Jour. Pharm. and Exp. Therap., September, 1919.
(5) Brit. Med. Jour., Feb. 7, 1920.

45 c.c. of methylated spirit. This was painted on after scraping every night and without scraping every morning, and used for three months or longer.

Acetylsalicylic Acid in Aqueous Solution. Irwin A. Becker[6] points out that solution of potassium citrate readily dissolves acetylsalicylic acid in sufficient quantity for the treatment of children. The most desirable proportions, to insure complete solution under the various conditions of compounding, are about 1 to 4, *i. e.*, for every gram of acetylsalicylic acid 4 grams of potassium citrate are required. Syrup may be added, if desired. Sodium citrate answers the purpose as well as potassium citrate, and is considerably cheaper. Probably a combination of the acetylsalicylic acid and the alkaline citrate is effected.

Salicylic acid also can readily be dissolved in water by the aid of sodium or potassium citrate in the proportion of 1 to 4; so that with a solubility of 1 to 460 in water, 0.3 gm. of salicylic acid and 1.3 gm. of sodium or potassium citrate will readily dissolve in a teaspoonful of water, *i. e.*, in the proportion of about 1 to 11.

Acetylsalicylic Acid Allergy. R. A. Cooke[7] considers certain acetylsalicylic acid reactions allergic[8] in nature, a trait inherited, according to the Mendelian law, as a dominant characteristic. Of the fifteen cases which form the basis of this paper, a positive antecedent history of hypersensitiveness existed in twelve; and, in the other three there were evidences of other forms of hypersusceptibility, such as asthma, urticaria and hayfever in the individual himself. These acetylsalicylic acid reactions begin, as a rule, from fifteen to twenty minutes after the ingestion of 0.60 gm. of the commercial drug. In nine of the fifteen cases, violent bronchial asthma was induced; and one case was almost fatal from asphyxia. The attack lasts from eight to thirty-six hours; and in one instance was prolonged for three weeks. In only three of the cases was urticaria present.

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(6) Jour. Amer. Pharm. Ass'n, May, 1920.

(7) Jour. Amer. Med. Ass'n, Sept. 6, 1919.

(8) Anaphylaxis is an antigen-antibody reaction, artificially induced by immunologic processes. Allergy is a natural hypersensitiveness of the individual not produced by immunologic processes, as the exciting agents or allergens are in many cases not capable of producing antibodies.

Constitutional reactions lasting three days have been produced after an intradermal test with not more than 0.1 gr. of acetylsalicylic acid. The reactions seem to depend in most cases on the chemical molecule as a whole. Three of the cases which showed a bronchial reaction to acetylsalicylic acid gave no reaction to salicylic acid, benzoic acid, antipyrin, sodium acetate or methyl salicylate.

In order to clarify our ideas on drug action, the author proposes the following classification of untoward drug effects:

1. Normal action—side action and toxic action.
2. Idiosyncratic action—(*a*) exaggerated normal action; (*b*) exaggerated side action; (*c*) lessened normal action (tolerance).
3. Allergic action—abnormal action.

A case of asperin allergy is reported by E. J. Tyrrell[9] in a man who, two hours after a meal, took 0.60 gm. aspirin. An hour later he felt a peculiar itching on face, chin and lips. His arms began to swell and in a short time wheals appeared on the skin. At the same time, his tongue became swollen and his whole face commenced to swell and assume a bloated appearance. He felt giddy and sleepy. At 5 p. m., there was a general dusky swelling of the whole face. He could open his mouth only a little, and the tongue appeared almost to fill the buccal cavity. His hands and arms were swollen to nearly twice their usual size. His pulse was quick and feeble. Within an hour of taking an emetic he was well enough to proceed home.

R. F. Bolt[10] reports a similar case of aspirin allergy in which one hour after the taking of 10 grains of aspirin, eyelids and lips began to swell. Within two hours the man had marked edema of the eyelids, lips and gums, and also running at the nose and eyes. The arms, chest and abdomen were covered with an urticarial rash. The pulse was 80 and the temperature normal. Two hours later the symptoms began to subside. He had a similar attack after taking 5 grains of aspirin.

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(9) Lancet, June 28, 1919.
(10) Brit. Med. Jour., Nov. 1, 1919.

Cinnamic Aldehyde in the Treatment of Lupus. Inspired by A. Landerer's use of cinnamic acid in tuberculosis,—a method which, though advocated first in 1898, never achieved great vogue and was abandoned after the death of its originator in 1904—A. Philippson[1] experimented with cinnamic aldehyde, a substance which is present to the extent of 80 per cent. in oil of cassia. He employed a suspension of 1 per cent. in water in form of a compress covered with waterproof material and left in place for one hour twice daily. On mucous membranes a 1:1000 suspension was used. This application produces strong burning, which after a while becomes less severe. On removal of the compress, the area is fiery red, the hyperemia gradually becoming less. In five cases of lupus treated in this manner, there at first occurred increased secretion, later crust formation, and finally healing. The author considers the effect to be due to the induced hyperemia and analogous to the Finsen-ray treatment, but much more convenient and less expensive.

DYES

Methylene Blue in Treatment of Gonorrhea in Women. During the past fifteen years, W. A. Dorland[2] has used methylene-blue locally in a very large number of cases of gonorrhea in women with, he declares, astonishing and gratifying results. He considers the time ripe for a full presentation of the method.

A 1 per cent. aqueous solution of methylene blue (stronger solutions are too irritating) not only acts upon the microörganisms, destroying their vitality and virulence, but also exhibits a remarkable curative effect on the inflamed surface and a striking analgesic action as well. In from twelve to thirty-six hours the soreness, pain and discomfort complained of by the patients have entirely disappeared in almost every instance, there is a decided diminution in the pus secretion after the third or fourth day, and a rapid disappearance of the mucosal congestion.

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(1) Therap. Halbmonatsh., June 15, 1920.
(2) Illinois Med. Jour., August, 1920.

The method of employment is as follows: After thorough cleansing of the affected parts with plain sterile water or a warm normal salt-solution, the surface is well dried. A cotton-wrapped aluminum probe, or a small pledget of cotton held in the grasp of a uterine dressing-forceps, saturated with the 1 per cent. aqueous methylene-blue solution, is carried to the internal os uteri, which in the vast majority of cases is found to be closed. If it is closed, the application should stop at this point; but if the internal os be patulous the instrument should be carried to the uterine fundus. The dye is rubbed in thoroughly and the instrument withdrawn. A larger loose pledget of cotton, held in the grasp of the dressing-forceps, is then saturated with the solution and the vaginal mucosa is bathed profusely in the blue down to the ostium vagina. The excess of the solution is squeezed out by pressing the pledget of cotton upon the valve of the speculum, and the lake of fluid thus obtained is emptied into the vagina as the speculum is withdrawn. A pledget of cotton held at the posterior commissure of the vulva catches the fluid as it escapes from the vagina, and the patient is instructed to bear down in order to expel the remainder of the solution. Special care should be taken to carry the blue into the fornices of the vagina and to paint the lateral walls which protrude between the valves of the speculum: As the result of an application made in this manner, the entire mucous surface of the cervix and vagina and lower part of the vestibule is painted a blue-black color. This color largely disappears in from twelve to twenty-four hours. If there is an associated specific urethritis, a small cotton-wrapped probe saturated with the blue is carried by a gentle rotary movement to the mouth of the bladder, which viscus is not entered. Not more than two or three urethral applications in any one case have been required in Dorland's experience, and, as a rule, the ardor urinae ceases with or shortly after the first application. The night of the day of treatment the patient is instructed not to use the syringe; but on each succeeding day until the next visit she will syringe twice daily with water as hot as can be borne without discomfort. Two such treatments in a week will generally effect a cure in from five to six weeks. The patient wears a vulva pad to avoid staining of the garments.

Silver Methylene Blue (Argochrom) in Gonorrheal Vulvogavinitis of Infants. This combination of methylene blue nitrate and silver nitrate, which contains about 20 per cent. of silver, is assumed to be particularly gonococcidal and endowed with penetrating action. Hildegard Eyth[3] believes that she has obtained decidedly favorable results in nine cases, at least as compared with those of the various forms of well-known therapy previously employed.

The local treatment consisted of hot sitz baths with potassium permanganate twice daily, followed by introduction into the vagina of a tampon saturated with a 2 per cent. solution of argochrom, and the introduction into the urethra of a cotton carrier with the same solution left in place for 15 minutes.

The local treatment was accompanied by intravenous injection of from 5 to 10 c.c. of 1 per cent. solution (Merck's ampules) every fifth day. These injections were well tolerated, with the exception of one case in which a few minutes afterward blue green emesis occurred. There was never any change in pulse, temperature or respiration. The urine was blue-green in from five to ten minutes after the injection, and always free from albumin.

In all cases this treatment was followed by a rapid diminution in the amount of discharge and, as a rule, negative smears in from eight to ten weeks, which is much shorter than with other treatment. The author, warns against making the statement that a few weeks of hospital treatment will produce a cure. She states at the very beginning that at least three months of treatment will be required and that cure can not be guaranteed in any case. She continues treatment for two weeks after the first negative smear; and then makes microscopic examination twice weekly for another two weeks before the case is dismissed.

Gentian Violet as a Bacteriostatic. John W. Churchman[4] reports further observations on gentian violet. He

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(3) Therap. Halbmonatsh., March 15, 1920.

(4) Jour. Amer. Med. Ass'n., Jan. 17, 1920.

finds that in wounds, as in the test tube, it is the Gram-negative organisms, which are least affected by the dye (Figs. 8-9). In attempting to apply gentian violet to the treatment of infected wounds, it is necessary to remove the secretions and fibrinous products of inflammation, which protect from the action of the dye (as effectively as a layer of grease would do) the underlying granulations in which lie the organisms concerned. After the usual cleansing of the skin surrounding the wound, the granulations themselves are gently washed with neutral soap, dried by mopping, and then flooded with hydrogen peroxide. This is repeated until the granulations are left naked. Minute pockets are cleaned, much as a dentist cleans the pockets in the gums. The cleansed granulations are dried by mopping with gauze, and are then painted with a saturated aqueous solution of gentian violet. The first coat is allowed to dry and a dry dressing applied.

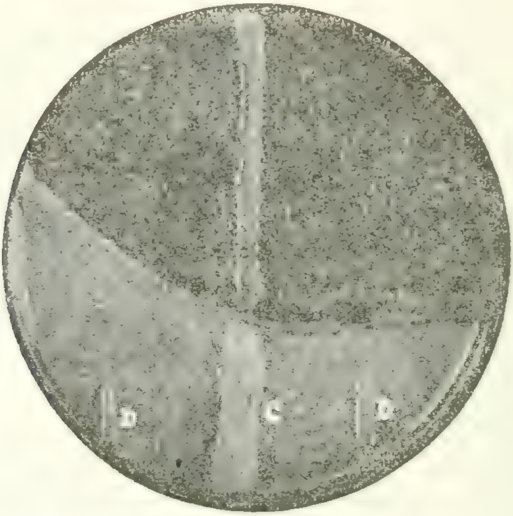

Fig. 8. Effect of gentian violet on *B. diphtheriae:* A divided gentian violet plate, the upper half of which contains gentian violet agar, and the lower half plain agar. The two lateral strokes (*D, D*) are of *B. diphtheriae,* and between them, for contrast, is a stroke of *B. coli* (*C*). *B. coli* grows equally well on the two portions of the plate, while *B. diphtheriae* fails to grow either on the gentian violet agar or anywhere near it.

Amputation stumps that have become diphtheria carriers present a most difficult problem to be dealt with.

Two such patients had been isolated as carriers, one for four months, and the other for several weeks; and, from the wounds of both, cultures for *B. diphtheriae* were found constantly positive in spite of treatment with diphtheria antitoxin, surgical solution of chlorinated soda (Dakin's solution), argyrol crystals, tincture of iodine, chromic acid, silver nitrate, etc. *B. diphtheriae* is Gram-positive and will not grow in mediums containing minute amounts of gentian violet, and, by means of it, both cases were freed of *B. diphtheriae* in a short time.

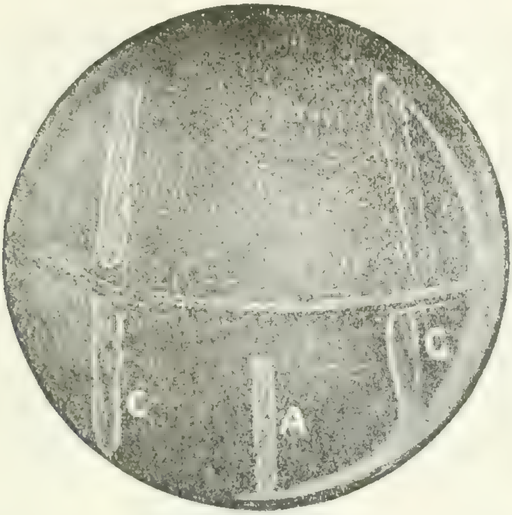

Fig. 9. Persistence of a Gram-negative organism in a wound treated with gentian violet: The organism obtained from the wound (*B. coli*) has been stroked across the plate at the sides (*C*, *C*) and grows equally well on the gentian violet agar and on the plain agar. At the center (*A*) the plate has been stroked with *M. aureus*, which fails to grow on the gentian violet agar.

In a large number of cases of severe gingivitis due to *B. fusiformis, i. e.* ulcerative gingivitis (Vincent's angina) the dye gave results that were extremely satisfactory. The penetration of the gum by the dye and its persistence are not open to dispute; and it certainly deserves more extensive trial in this and kindred types of gingivitis.

Gentian Violet in Treatment of Purulent Arthritis. John W. Churchman[5] reports two cases of staphyloccus

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(5) Jour. Amer. Med. Ass'n., Aug. 28, 1920; also Practical medicine Series, 1918, Vol. VI, p. 41.

arthritis, and one of pneumococcus arthritis treated by lavage and staining with gentian violet, both of which promptly returned to normal. In three cases of gonorrheal arthritis very satisfactory results were likewise obtained. This is somewhat curious in view of the fact that the gonococcus is Gram-negative and might be expected to be unaffected by gentian violet.

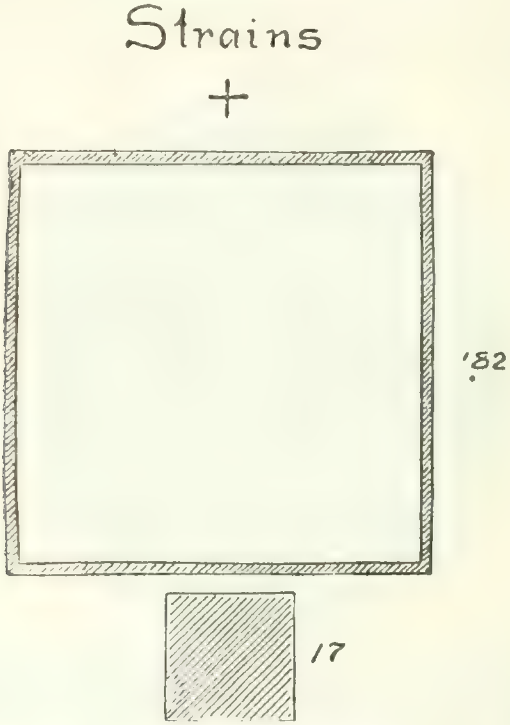

Fig. 10. Schematic representation of effect of gentian violet on Gram-positive organisms; study of 182 strains. The central white square represents the number killed by the dye (165); the shaded border the number unaffected (17). The area of the shaded border is shown in the shaded square.

The conclusion that pyogenic arthritis due to *Staphylococcus aureus* or to pneumococcus may be cured by this method is fully warranted by the facts as to the parallelism between the Gram stain and the gentian violet reaction, revealed by a study of 318 bacterial strains, represented in Figures 10 and 11.

Whether this parallelism is accidental or depends on some fundamental structural or chemical difference between the Gram-negative and the Gram-positive organisms is a problem, the solution of which is now being sought.

What is particularly interesting in this connection is the fact that it is possible to stain with gentian violet the living epithelium of the mucous membrane of the bladder, in experimental animals, without doing any appreciable damage to the tissue cells. The absence of signs or symptoms of irritation in the human beings whose knee-joints have been injected justifies the assumption that the process is equally harmless for synovial epithelium. This assumption has received experimental confirmation from a study of the effect of the dye on protozoa (oxytricha and paramecia), and on living tissue growing *in vitro*.

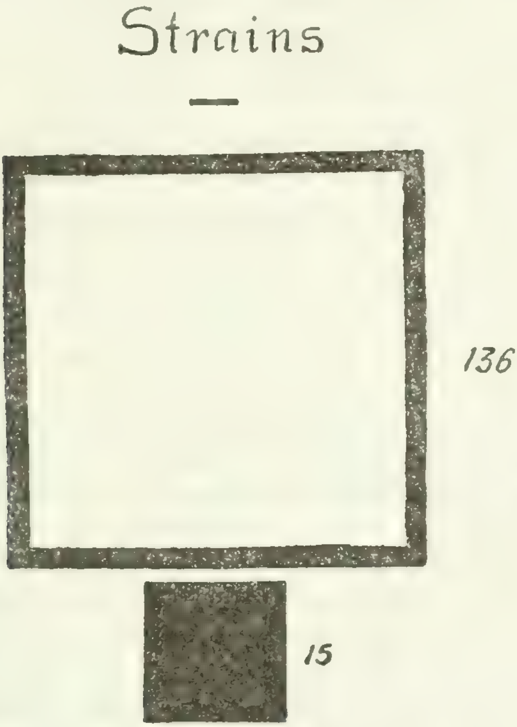

Fig. 11. Schematic representation of the effect of gentian violet on Gram-negative organisms; study of 136 strains. The central white square represents the number unaffected by the dye (121) ; the black rim the number killed (15). It will be noted that the facts are just the reverse of those for the Gram-positive organisms. The area of the black border is shown in the black square.

Gentian violet injected into the circulation soon disappears from the blood stream. This change is not due to mere contact with blood, nor does the disappearance of the dye depend on blood oxidation. Its fate is, therefore, unknown. A chemical substance which kills many bacteria of clinical importance, which does not injure tissue cells in the dilutions employed, which persists for some time in the system but is finally disposed of, and which penetrates tissue apparently possesses valuable properties not found in other bacteriostatic agents.

MISCELLANEOUS ANTISEPTICS

Copper Sulphate in Puerperal Sepsis. H. Noiré[6] reports recovery in four apparently hopeless cases from the intravenous use of ammoniacal copper sulphate, as recommended by A. Mauté (1918). Within from 24 to 48 hours after the first injection, the temperature dropped to normal. From two to six injections were given daily. In addition, local surgical treatment was given.

As a result of his experiences, Noiré advises, in cases of puerperal fever, the intravenous injection of 4 per cent. ammoniacal copper sulphate (a daily dose of 0.08 gm.) continued until the temperature is normal. In his experience this has always occurred within three days. The rationale of this treatment depends on a specific effect of copper upon the streptococcus infection from which, all four of the author's patients suffered.

Ammoniacal copper sulphate is much superior to ordinary copper sulphate for intravenous injection, as it does not hemolyze or precipitate protein. It is prepared as follows: In a closed bottle, one prepares a saturated solution of copper sulphate in ammonia water. This solution is brought in contact, by means of a dialyzing membrane, with 90 per cent. alcohol. Within about 24 hours, crystals of ammoniacal copper sulphate have formed, which after having been washed with alcohol, are rapidly dried with blotting paper and preserved in a well closed bottle. The 4 per cent. solution of this salt must always be given intravenously. The least drop injected subcutaneously produces an eschar.

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(6) Presse méd., June 5, 1920.

Chloretone as a Preservative. Herbert C. Hamilton[7] believes that chloretone deserves special recognition as a preservative. As a germicide, it has a phenol coefficient of 1.2. When used as bacteriostatic in a medium saturated with chloretone in no case was growth observed over a period of three weeks. It is absolutely essential that the container be closed against volatilization of the chloretone and a full container is advisable because of the tendency of chloretone to crystallize on the walls above the solution. When used with these precautions, it may be recommended as a preservative in cases in which the preservative action of alcohol must be eliminated and in which sterilization by heat is impracticable because of its destructive action on sensitive organic compounds.

Tricresol Toxic on Subdural Injection. By experiments on dogs, A. E. Livingston[8] found that the subdural injection of even a moderate amount of tricresol serum (2 c.c. of 0.5 per cent.) performed very slowly causes a fall in blood-pressure and stoppage of respiration, which is not due to increased cerebrospinal-fluid pressure, but to some toxic property of the phenol preservative.

Soaps for Hand Washing Not Disinfectant. John F. Norton[9] tested soaps by bacteriologic experiments to decide whether or not they really possess germicidal properties that might be of aid in preventing the spread of disease. His conclusions are that sterile hands are not obtained in the ordinary process of hand washing. More bacteria were found to be removed by the ordinary toilet soaps than by the special soaps. In other words, the cleansing properties of a soap are more important than its "germicidal" or "antiseptic" constituents. The soap solutions obtained in washing are of no practical germicidal or antiseptic value. The soap left on the hands after washing has no germicidal action.

[These experiments did not include the liniment of soft soap, commonly called "tincture of green soap,"

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(7) Jour. Pharm., October, 1919.
(8) Jour. Pharm. and Exp., Therap., May, 1920.
(9) Jour. Amer. Med. Ass'n., July 31, 1920.

so generally used in surgical disinfection of the hands and which no doubt has a high germicidal value, as it contains almost 50 per cent. of alcohol, and is strongly alkaline as well.—Ed.]

Argyrol. W. B. Lancaster[1] argues that argyrol and similar silver preparations should not be *compared* as to action with silver nitrate, but rather *contrasted* with it. The field of action and special virtues of the two are different and distinct. The nitrate is caustic (due to NO_3 ion); it acts very quickly but also loses its effect at once in the presence of an excess either of a soluble chloride like common salt or of albumin. Argyrol is not only not caustic, it is not even irritating. It is not rendered inert by serum or by sodium chloride. Naturally, two substances differing so widely in their properties may be expected to have different effects. The fact that 1 per cent. nitrate of silver is a more powerful germicide in water than argyrol in any strength, even 50 per cent. is no reason why argyrol may not be far superior to nitrate of silver for certain other purposes; and that is, indeed, quite true. Lancaster is convinced, from tests performed by him, that argyrol is a powerful antiseptic as tested on *Staphylococcus aureus* in serum, or in salt solution, or water; it is effective in strength as weak as 1 per cent. or even less. It also has bactericidal power, especially in strengths of 10 per cent. or over—the strengths most generally recommended. It is, however, slow in action.

There is to-day a very widespread belief in the clinical value of argyrol in conditions in which a drug with germicidal or antiseptic properties would seem indicated. The belief is almost as widespread as the laboratory evidence is positive in proving that argyrol has no germicidal power. Any apparent conflict between laboratory and clinical evidence is certain to be explained away sooner or later. Here if not everywhere "all discord is harmony *not understood.*"

Potassium Permanganate Lotion for Prevention of Venereal Diseases. Sir Archdall Reid[2] advocates careful sponging with a solution of potassium permanganate

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(1) Boston Med. and Surg. Jour., Nov. 11, 1920.
(2) London Letter, Jour. Amer. Med. Ass'n., Nov. 15, 1919.

1:2,000 as simpler than and quite as efficient as the more elaborate methods, such as urethral injections and the use of calomel ointment. He believes there is not on record a single instance of failure of the method of quick disinfection. The operation is actually about as difficult and dangerous as washing the hands with soap and water.

ALLEGED SPECIFICS

Ether in Whooping Cough. L. Cheinisse[3] summarizes the experiences of a number of authors with intramuscular injections of ether in the treatment of bronchopneumonia, of scarlet fever and of measles, but with especially favorable results in whooping cough. Audrain gives an intramuscular injection of 1 c.c. of ether in the treatment of whooping cough in infants of 7 or 8 months, and 2 c.c. for older ones, on alternate days, and has always found it successful in arresting whooping cough. The injections are made in the buttocks, better over the iliac crest than over the great trochanter. Three injections usually suffice. He states that those cases that do not respond to this treatment must have been wrongly diagnosed. Thus cases of whooping cough in which adenoids are a factor are improved but not cured. It does not cure cases of spasmodic cough due to adenoids, or other causes, but relieves them. It is a question whether ether acts simply by lessening the tendency to spasm. Audrain ascribes the action to its antiseptic properties. Dalché reports favorable results in a woman of 21 from three injections of ether. Courcoux reports two negative cases. Variot had two negative cases and two positive results. Dufourt found it useful in whooping cough and bronchopneumonia. Lassalle obtained good results in the treatment of bronchopneumonia itself.

Effect of Guiacol Group on Tubercle Bacillus. L. M. DeWitt, B. Suyenaga and H. G. Wells,[4] in order to determine whether guiacol, so frequently used in tuberculosis, can have any direct action on the causative or-

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(3) Presse méd., July 31, 1920.
(4) Jour. Infec. Dis., August, 1920.

ganism, tested the bacteriostatic effect of a considerable number of the series. None of the compounds studied showed definite therapeutic action in experimental tuberculosis in guinea-pigs. *In vitro* experiments demonstrated that guiacol, creosote, hydroquinone and guiacol cacodylate required a concentration of 0.1 per cent. (1:1,000) to inhibit the growth of tubercle organisms completely. This low bacteriostatic power makes it clear why there is failure to observe any beneficial therapeutic effect on tuberculous guinea-pigs. These substances may have value in open tuberculosis infections in man in which other bacteria than *B. tuberculosis* are involved. But it substantiates the opinion generally reached by careful clinical observers, that creosote and guiacol have no specific action on tuberculosis infection.

[It would be unfortunate if, on the basis of these observations, creosote were discarded from the therapy of tuberculosis; and this, no doubt, is not the lesson to be gathered from the report. That creosote and guiacol are useful in certain cases of tuberculosis can not be doubted. It lessens the amount of expectoration and with this the coughing; and may, in addition, have antipyretic value.—Ed.]

Sodium Gynocardate "A" of no Value in Pulmonary Tuberculosis. As the result of its use in a number of cases of pulmonary tuberculosis, Max Biesenthal,[5] arrives at the conclusion that this preparation is of no value in this disease. With the exception of two cases, the injections were not followed by reactions of any type. No patient showed a change for the better in his physical findings. No sputum changes from positive to negative were noted.

Colloidal Selenium in Inoperable Cancer. E. Watson-Williams,[6] gives a brief preliminary report of the administration of selenium in a series of twenty-four cases. Selenium as available for injection is a not very stable, "protected," colloidal suspension of erythro-selenium beta. It should be isotonized before injection with sodium chloride solution. In therapeutic doses, the author states, it appeared to be non-toxic. He injected

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(5) Amer. Rev. Tuberculosis, April, 1920.
(6) Brit. Med. Jour., Oct. 11, 1919.

a dose representing from 0.0005 to 0.005 gm. of the metal, preferably intravenously, every day. There is a general transient reaction, occasionally slight malaise, and slight rise of temperature with the earlier injections. The author noted the following beneficial results in nineteen cases: Diminution in size of tumor, and of secondary deposits, lessening of tenderness, and disappearance of pain, healing of ulcerated surfaces, decrease of discharge and increased mobility, increase of weight (two cases), improved sleep, memory and general health. Improvement was most marked in carcinoma of the alimentary tract. In carcinoma of the larynx (eight cases) it appeared advisable to proceed cautiously so that the treatment could be suspended in the event of focal reaction.

Silica in Tuberculosis. On the basis of the observation, that the pancreas of tuberculous patients contained less silica than the pancreas of normal individuals, and that the urine of the tuberculous likewise contained less SiO_2 than the normal, A. Kühn[7] undertook the treatment of consumptives with this substance. In an attempt to present the silica in an easily absorbable and non-irritating form, Kühn made use of a tea composed of herbs rich in silica, all of which, curiously enough, have been tuberculosis remedies among peasants. He employed a decoction of equisetum (75 parts), a species of polygonum (150), and of galeopsis (50), of which one and a half tablespoonfuls were added to two cups of water which was boiled down to one cup. This dose, which is rich in silica, was taken three times daily, in addition to the ordinary treatment for tuberculosis, and the use of calcium medication. He has the impression that the silica had a decidedly favorable effect in his cases.

Subsequently Kühn[8] employed, instead of this ill-tasting tea, ''silicol'' tablets (0.1 gm. SiO_2) with encouraging results. The simultaneous administration of lime and silica is not advisable, because of formation of insoluble calcium silicate. It is better to use these mineral remedies alternately.

[Treatment based on the dimineralization theory of the

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(7) Therap. Monatsh., June, 1919.
(8) Münch. med. Wochschr., 1920, p. 253.

causation of tuberculosis has, it seems, missed the use of silica in the past. Whether this addition will be of importance, time alone can tell.—Ed.]

ANTHELMINTICS

Oil of Chenopodium in Hookworm Disease. O. T. Brosius and W. A. Bishop[9] employed soft gelatine capsules of 0.3 c.c. each, though they believe that freshly filled, hard gelatine capsules would have yielded an even higher percentage of efficiency. They found that dietetic restrictions and preliminary purges were unnecessary and that chloroform seemed superfluous. Strong adults were given three capsules, two hours later two capsules, and after two hours three capsules more. Three hours later, two ounces of castor oil were given. Adult women generally received six capsules in the entire treatment, three doses of two capsules each, at two-hour intervals, followed by the castor oil. The doses for children were modified almost in accordance with Young's rule. It is safe to give a child 1 minim for every year of age, to be repeated once in two hours, followed in three hours by the castor oil. Very young children were given the drops with a teaspoonful of sugar. In all cases, the condition of the patient was noted before the subsequent dose was given; and, if there was evidence of much depression, the last dose was omitted. The first treatment almost always expelled most of the worms (about 84 per cent.). In first and second treatments together, 95 per cent. of the worms were expelled. In view of the fact that hookworms can not reproduce themselves in the intestine of the host, it is quite conceivable that great good is done even by giving only one treatment.

Several patients exhibited toxic symptoms attributable to chenopodium. These symptoms were nausea, vomiting, general depression, weakness and vertigo, with deafness, usually temporary. When permanent, it always had a background of syphilis or other pre-existing disease.

The authors consider it demonstrated that a 35 to 40 minum treatment is all that is necessary, and that in the

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(9) Jour. Amer. Med. Ass'n., June 26, 1920.

great majority of instances two of such treatments will effect a cure.

The fact that oil of chenopodium acts as a vermifuge to more than one of the other intestinal parasites is an added factor in its favor.

Anthelmintic Effect of Neo-arsphenamine, M. Friedmann[1] reports the case of a syphilitic woman who took daily 0.3 gm. neo-arsphenamine in a glassful of water for six days, a total of 1.8 gm. of neo-arsphenamine, corresponding to 0.408 gms. of arsenic. The only noticeable effect was diarrhea which occurred on the third day, and the fact that the pin-worms which had previously been very much in evidence, suddenly disappeared entirely from the feces. Prior to the taking of the neo-arsphenamine the stools contained a great many of the worms, and the woman suffered nightly from severe pruritis ani. The itching ceased and the feces became normal, even so far as examination for eggs showed. The Wassermann reaction remained uninfluenced by this enormous dose which, so far as can be determined, had never previously been ingested. In this case, the patient took the dose of her own accord. The author merely reports the case, without advocating either repetition of such dosage or the employment of neo-arsphenamine as an anthelmintic.

Anthelmintic Action of Benzyl Alcohol. D. I. Macht[2] finds that benzyl alcohol and benzaldehyde are quite toxic to worms. In view of their slight toxicity when taken by mouth the possibility is suggested that they might be useful as anthelmintics. However, a few patients suffering from tapeworm were not completely relieved by the administration of these agents in enteric capsules.

Betanaphthol Poisoning. W. G. Smillie[3] tested the Bayma and Alves (1918), method for treating hookworm disease with betanaphthol, as modified by Gonzaga and Lima (1918), who give 6 gm. of betanaphthol early in the morning and repeat the dose for three successive days. Throughout treatment the patient receives only a light diet. Two hours after the last dose of betanaphthol,

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(1) Therap. Halbmonatsh., March 1, 1920.
(2) Jour. Pharm. and Exp. Therap., December, 1919.
(3) Jour. Amer. Med. Ass'n., May 29, 1920.

a saline purge is administered. By this method, Gonzaga and Lima effected 73.5 per cent. of cures among 400 heavily infected patients, and no severe toxic symptoms were encountered.

As a result of field experiments with these large doses (18 gm.) of betanaphthol, in a series of seventy-nine cases, Smillie noted two patients with severe intoxication, and two others with marked changes in the blood cells.

He concludes that betanaphthol in 6 gm. doses, given on three successive days, may produce a severe toxic effect similar to that caused by benzol (benzene, C_6H_6), in that it specifically attacks the red blood cells. In the four cases of betanaphthol poisoning reported, while the symptomatology varied greatly, the essential pathology common to all cases was a destruction of red blood cells with, perhaps in the severe cases, a destruction of the blood-forming cells in the bone marrow, with resulting severe anemia, icterus, enlargement of the spleen and liver, enlargement of the gall-bladder and hemoglobinuria. The white blood cells apparently were not destroyed by the drug. The liver, spleen, kidneys and other organs of the body were not affected primarily, but were markedly affected secondarily, because of the anemia, and because of the injurious effects produced by the elimination of large numbers of destroyed red blood cells. In three of the severe cases of poisoning there was a history of recent malaria. It is probable that those cases in which red blood cells are rendered more fragile by recent malaria are more susceptible to betanaphthol poisoning.

Betanaphthol, in 18 gm. doses, is so toxic that it can not be recommended for general use in the treatment of hookworm disease.

RESTORATIVE THERAPY

PROTECTIVES AND ASTRINGENTS

Kaolin as a Substitute for Bismuth Subnitrate. In the Paris letter of the *Journal of the American Medical*

Association,[4] attention is called to a recent communication to the Academy of Medicine by Dr. Georges Hayem, who suggests that kaolin be employed instead of bismuth subnitrate. Favorable results were obtained in all conditions for which he had usually prescribed bismuth subnitrate, especially for the relief of gastralgia. If thoroughly cleansed, kaolin has no pronounced taste, and it can be employed mixed with water without a corrective. Still, the kaolin may be made more pleasant by adding to each 40 gm. one drop of essence of anise, or six drops of essence of mint. Prof. J. Stumpf of Würzburg has recommended finely powdered kaolin for the treatment of acute and chronic intestinal infections, especially cholera. According to Stumpf the remedy acts in a purely mechanical fashion by "burying the germs in clay."

Astringent Dusting Powder for Excessive Sweating of the Feet. J. A. López[5] recommends a dusting powder consisting of 60 parts alum to 40 parts talcum powder for the reduction of excessive sweating, elimination of bad odor, and prevention of maceration of the skin.

Digestion of the Tannin Compounds Used as Intestinal Astringents. Paul Nicholas Leech,[6] as a result of tests with artificial digestive mixtures, arrives at the following conclusions:

Only one type of the tannic acid compounds studied completely resists the action of the gastric juice and is broken down in the intestine according to theory, *i. e.*, the diacetyl tannic acid compound. "Acetannin calco" is satisfactory (however, only one specimen of this product was available when the study was made). "Tannigen" is fairly satisfactory in some instances; in others it is not; certain it is that the market supply of "Tannigen" is not of reliable composition.

"Protan" and "tannoform" are probably not broken up to a great extent in the intestine.

"Albutannin calco" and "albutannin M. C. W." are not nearly so resistant to the acid-pepsin digestion as

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(4) May 29, 1920.
(5) Semana Méd., March 25. 1920.
(6) Jour. Amer. Med. Ass'n., Oct. 23. 1920.

''tannalbin'' and ''tannin albuminate exsiccated'' (the latter now sold as ''albutannin, Merck) are themselves not sufficiently resistant to the acid-pepsin medium, but they do liberate free tannic acid in the alkaline-pancreatic medium.

With the exception of the specimen of acetannin, none of the products which were examined conformed strictly to the claims made for them.

FOOD

Diet in Diabetes. The modern treatment of diabetes—commonly known as the Allen diet—has received a confirmation regarding its value by the effects of war diet upon the mortality from diabetes. G. Rosenfeld[7] quotes the following statistics:

MORTALITY FROM DIABETES

Year
1912, Berlin 459, Breslau 100, Munich 96
1918, Berlin 177, Breslau 51, Munich 77

He considers this marked reduction in mortality due to the limited use of meat and the great total restriction in nourishment, and reminds us of the dictum of Bouchardat. ''*Mangez le moins possible.*'' (eat the least possible).

F. M. Allen[8] characterizes the modern treatment of diabetes as an attempt to relieve over-strain of a weakened assimilative function by limitation of the diet. In the more severe cases, such relief is most quickly and thoroughly obtained by fasting, either immediately or after a preparatory fat-free diet. The chief difficulties are found in the arrangement of the subsequent diet. Excess in total calories has been the commonest mistake, and responsible for much unfavorable progress and mortality. The proportions of various foods are also highly important. Five facts may serve for guidance in planning diets after fasting:

a The total calories at first should be very low and increased gradually.

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(7) Centralbl. f. inn. Med., 1919, p. 249; abstracted in Therap. Halbmonatsh., January, 1920.

(8) Jour. Amer. Med. Ass'n., Feb. 28, 1920.

b Protein is the most important food. Use almost pure protein diets until the blood sugar falls to normal, and then gradually build up a maintenance diet to such level as is possible without return of hyperglycemia or marked acidosis.

c The tolerance for protein is highest when other foods are excluded or closely restricted.

d The caloric requirement falls with the body weight, and may reach a very low minimum.

e The tolerance rises as the weight falls; and with exceedingly few exceptions the two curves intercept at some level on which life can be supported. The ultimate criterion of the severity of diabetes is the level of diet and body weight which can be endured without return of symptoms.

Solomon Strouse,[9] insists that the difficulties of the modern treatment of diabetes are often greatly exaggerated. Metabolic investigations have been confused with practical therapy. Elaborate equipment is not required. The identification of the reducing substance as glucose is necessarily the first step in the laboratory work. The amount of the reducing substance is less important than the certainty regarding it nature. The presence or absence of signs of acid intoxication tested for by sodium nitroprusside and ferric chloride urinary tests, with or without ammonia determination, give information of the greatest value. Blood-sugar study has become so simplified of late that it can be carried on in a comparatively easy way in a well equipped office.

We must individualize: *e. g.* individuals with a big reserve of fat offer an entirely different therapeutic problem from the thin, highly nervous woman with tachycardia, or the older person with arteriosclerosis and albuminuria. Get the patient sugar free without producing or increasing an already existent acidosis. In mild cases this is done simply enough by attention to carbohydrates, gradual reduction of which will almost invariably result in an aglycosuric urine. In the severe or even doubtful cases, in the presence of acidosis or threatened acidosis, the cautious physician will leave the carbohydrates alone and devote his attention to the

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(9) Jour. Amer. Med. Ass'n., July 10, 1920.

fats. It is, indeed, surprising how often elimination of fats in the diet, results not only in immediate reduction of acidosis, but also in the diminution or even disappearance of glycosuria. It is true that some of the more severe cases, already rendered free from signs of acidosis, require the complete absence of food before sugar disappears. Any patient, no matter how severe his case, can and should be made aglycosuric. By recognizing the truth of this, it is possible to fulfil the main requirement in treatment; namely, to increase the patient's food tolerance. It is a rule of almost absolute certainty that as the diet is reduced, so is food tolerance built up. If we wish to make any permanent impress on the diabetic's life, we can not do it by a two or three weeks' stay in an institution, no matter how scientific our efforts or how brilliant our results.

Alice N. Dike,[1] studied the question of whether diabetic patients cost the hospital more for their food than other patients, or whether the diabetics were right when on "fasting" days they remarked: "The hospital is making money on us." Results showed that the diabetics were costing 29 per cent. more than other patients. This should not be surprising when it is remembered that the diet requirements for diabetics in severe cases eliminate practically all the cheap carbohydrate foods.

The following items in the article seem of special interest. "Agar-agar used in the highly prized bran muffins makes possible the one article which in any way resembles bread, and helps to give bulk to the diet." "Liquid petrolatum is used in cooking, and makes possible fried eggs and some other foods."

Diet in Combined Diabetes and Nephritis. Frederick M. Allen, J. W. Mitchell, and James W. Sherill[2] advise that the treatment of combined diabetes and nephritis be conducted according to the usual principles for the two diseases. A special difficulty is sometimes supposed to exist in the combined management, but recent methods have largely obviated the conflict. Diabetic treatment by means of a high protein diet, gluten bread and the like may be inimical to an associated nephritis with im-

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(1) Jour. Amer. Med. Ass'n., Oct. 4, 1919.
(2) Ibid., Aug. 14, 1920.

paired nitrogen excretion; but it is readily possible to adjust the protein ration to both diseases. If meats are forbidden in the treatment of hypertension, the diet of a diabetic with hypertension is seriously limited; but Allen[3] has shown that with restriction of salt such a patient is able to choose his protein at will. One of the greatest dangers formerly consisted in acidosis in conjunction with nephritis; this is avoided under the modern treatment which keeps acidosis strictly absent.

Vegetarian Diet in Obesity. A. Albu[4] reports remarkable losses of weight—as much as one-third of the body weight—as the result of the largely vegetarian diet forced on his countrymen by the war. On the other hand, in thryogenous or endogenous obesity the result was completely negative.

The Use of Benzosulphinide. Reynold W. Wilcox[5] believes that the use of saccharin should be encouraged instead of being discouraged. It is of value in sickness as well as in health.

Benzosulphinide may be used in tablets for sweetening tea or coffee, 0.006 to 0.03 gm. to a cup is sufficient. Inasmuch as this substance is largely excreted into the saliva, unless small amounts are used, a disagreeable taste in the mouth may be established. It has been demonstrated that, even when long continued, its use does not interfere with the action of any of the digestive enzymes. Small daily amounts (0.3 gm.) may be taken during long periods of time (months) by normal adults without any detriment to health ascertainable by all available methods of study. This amount represents in sweetening power 150 gm. of cane sugar, which is usually the limit of sugar tolerance for the adult; so that for a person who uses it for all purposes—tea, coffee, in puddings, pastry, cereals, etc.—for which sugar would be used for sweetening, saccharin can be employed in its place without producing disagreeable taste. It is believed, however, that relatively large doses, especially above 1 gm. if continued for months, are liable to induce

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(3) Jour. Amer. Med. Ass'n., March 6, 1920.
(4) Therap. d. Gegenw., 1920, p. 89; abstracted in Therap. Halbmonatsh., May 1, 1920.
(5) Med. Record, Oct. 9, 1920.

disturbances of digestion; but this amount is never likely to be reached, as it would provoke a permanent taste of bitterness. Hence, as a condiment saccharin is absolutely fool-proof.

Its use in diabetes is too well known to require further comment.

Because it has no food value, it is useful in obesity to satisfy the craving for sugar, and so to render more tolerable the reduction of the food ingested.

In gout, inasmuch as the successful dietetic treatment of this disease requires not only the regulation of the quality but limitation of the quantity of food as well, saccharin is valuable in replacing sugar as a sweetening agent.

In certain digestive and metabolic disturbances, in which the fermentation set up by cane sugar and the consequent disturbances of nutrition, result in this being interdicted, saccharin may be used to replace it. Rheumatism is often obviated by the avoidance of sugar and its replacement by saccharin. New-born infants should receive cool water to which saccharin in from one to two hundredths of one per cent. has been added, thus insuring the proper ingestion of water and avoiding alimentary disturbances so frequently caused by the administration of sugared water.

The author then quotes Joslin: "In the United States, between the years 1800 and 1810, the average amount of sugar consumption per capita was eleven pounds per year; between 1910 and 1917, this amount has risen to 73 pounds; and Hoover estimates that for the year 1918 it will be 90 pounds. This last amount is nearly four ounces (120 gm.) per day, which closely approximates sugar tolerance of the organism." Diabetes was four times as prevalent in Boston in 1918 as it was in 1890, and twice as prevalent in the registration area of the United States as in 1900. If diabetes should continue to increase in the next thirty years at the same rate statistics show it has increased in the last thirty years, it would rival tuberculosis as a cause of death, and if this rate progresses for another generation diabetes would be responsible for almost the entire mortality of the world. Wilcox concludes that if we are to escape the serious menace to health from the inordinate consumption of sugar and at the same time satisfy the "sweet tooth" of the community the proper use of saccharin as a condiment must be encouraged by all scientific physicians.

Meat Diet in Icterus. An editorial in *Gazetta Degli Ospedali e Delli Cliniche,*[6] quotes favorably as agreeing with the editor's experience the work of Chevalier (1919), who advocates meat diet in icterus regardless of the cause of the jaundice. Milk should be used only when the patient is very ill, but from the moment he can digest solid food, broiled meat is given, first in small quantities, but later in larger amounts. The writer emphasizes the prohibition of bread, sweets and fat. Vegetables are used to satisfy the hunger and to make up for the lack of carbohydrate in the meat diet. Chevalier claims that by the routine he describes, not only is the course of jaundice shortened, but the asthenia is suppressed and consequently convalescence is less prolonged. The icteric patient who eats largely of meat is cured before the jaundice has disappeared; for the patient is strong and may take up his work while still jaundiced.

Buttermilk better than B. Bulgaricus Culture. John L. Morse[7] considers *Bacillus bulgaricus* more effective when given in the form of buttermilk than in tablets or cultures, because it is numbers that count, and there are infinitely more organisms in buttermilk than in any tablets or little tubes of cultures. Furthermore, the buttermilk contains considerable amounts of lactic acid, which is of itself inimical to the growth of the gas bacillus and of putrefactive organisms. The lactic-acid forming organisms are sometimes of benefit in the treatment of putrefactive intestinal conditions. It must be remembered, however, that the lactic acid organisms can not change the bacterial flora permanently. This can be done only by so changing the diet as to change the character of the culture medium in the intestine. It is doubtful whether the growth of other pathogenic organisms can be influenced by the administration of any other organisms in the food.

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(6) Dec. 18, 1919.
(7) Jour. Amer. Med. Ass'n., July 10, 1920.

Vitamines and Calcium in the Diet. The following practical conclusions, are arrived at by E. B. Forbes,[8] as a result of his studies of the literature:

The present predominance of meat, cereals, and sugar in the diet, possible since man became a hunter and a farmer, has meant the partial replacement of nuts, fruits and leafy vegetable foods. In this manner, we have impoverished our diet in calcium and in the fat-soluble vitamine, for both meat and cereals are very low in these two dietary essentials; and sugar, of course, contains neither. It seems impossible that man's inherited food requirements should have kept pace with these comparatively recent changes of food habit.

Hence, many dietaries are on the ragged edge of calcium insufficiency. The one food best suited to supply the prevailing lack of calcium and of fat-soluble vitamine in the human ration is milk. Eggs are also very rich in fat-soluble vitamine, and contain a considerable amount of calcium; but not nearly so much as milk. Glandular organs, such as liver and pancreas are also rich in fat-soluble vitamines.

The leafy vegetable foods are useful sources of calcium, of fat-soluble vitamine, and also of iron, which many dietaries lack; but the extent of their usefulness in the human diet is limited by their bulky fibrous nature and their low protein content.

The practical significance of this whole subject is not merely related to beriberi, xerophthalmia, and scurvy. By far the most important bearing of the facts as to the vitamines is in relation to growth, efficiency, general tone and resistance. The lack of these substances is especially apt to develop during periods of stress, as in pregnancy, lactation and infectious disease.

The following rules may be formulated:

To prevent shortage of the water-soluble vitamine in the diet avoid an undue preponderance of cereal products which lack the germs of the grain.

To avoid deficiency of the fat-soluble vitamine make liberal use of milk and milk products, eggs and leafy vegetable foods.

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(8) Ohio State Med. Jour., June, 1920.

To guard against lack of the antiscorbutic vitamine in the diet of the infant give some vegetable food, especially orange or cooked tomato juice, at an early age; and in later life make liberal use of fresh fruits and vegetables.

Preservation of Lemon Juice. P. W. Bassett-Smith[8] prepared lemon juice to conserve its antiscorbutic properties in the following manner: The juice of fresh lemons is evaporated down in vacuo at room temperature to a specific gravity of 1.3; it is then a dark yellow, viscid, and very acid fluid, easily made into solid tablets with lactose, etc., and keeping well either in the concentrated juice or tablet form.

Experiments showed that the concentrated juice may be kept indefinitely without becoming mouldy or fermenting. This is probably due to the intense acidity and viscosity, for on dilution of the juice with water it rapidly becomes contaminated with bacterial growth. Animal experiments were carried out to determine whether short periods of exposure to a high temperature, or longer ones at a lower one, could be used without destruction of the antiscorbutic properties for preservation of the original lemon juice in transit and assistance in concentration of the juice. It was found that boiling the lemon juice for five minutes does not appreciably diminish the antiscorbutic property, while heating for three-quarters of an hour at 58° C. diminishes it to a more marked degree.

SUGAR

Sugar Enemas. In vomiting of pregnancy, Frank W. Lynch[9] employs a solution of glucose and soda given by rectum in doses of from 8 to 10 ounces at fixed intervals. The drip method soon causes irritation.

This is in line with the plan of J. W. Duncan and V. J. Harding[1] who extoll the beneficial effect of high carbohydrate feeding in nausea and vomiting of pregnancy. The patient is advised to rest. Meat and fatty foods are eliminated from the diet and their place is taken by a liberal supply of carbohydrate food, such as potato, rice,

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(8) Lancet. Nov. 13, 1920.
(9) Jour. Amer. Med. Ass'n., Aug. 16, 1919.
(1) Can. Med. Ass'n Jour., December, 1918.

oatmeal, vegetables and fruit. In addition from 1000 to 1500 c.c. of a 5 per cent. lactose solution are taken daily by mouth, or by rectum if not tolerated by mouth. When lactosuria occurs, or when the nausea and vomiting are fully controlled, the amount of lactose is cut down. The patient may then rapidly return to ordinary diet. All women so treated recovered quickly, and were delivered at full term of healthy children.

George W. Crile[2] uses sugar solution enemas in treatment of peritonitis. He employs 5 per cent. sodium bicarbonate, with 5 per cent. glucose by rectal tap, continued as long as it is tolerated.

Glucose in Pneumonia. Henry J. John[3] as a result of extensive experience with pneumonia cases during the influenza epidemic of 1918-1919 has arrived at the following conclusions:

The administration of glucose is without danger, provided reasonable care is used. In his 1,200 administrations not a single accident occurred.

The patient is made comfortable and sleep is provided for him. Through this the whole organism is strengthened for the prolonged fight against the infection.

The temperature is lowered.

Nutrition is provided for the over-taxed heart muscle without having to go through the ordinary digestive processes, storage in the liver as glycogen, and reconversion into glucose again before it can be burned by the tissues. One hundred to 300 calories is thus supplied to the body in each dose.

A considerable amount of fluid is provided for the circulation. This, together with the preceding, slows the heart, producing thus artificial rest.

Elimination through the kidneys and the skin is increased.

Practically all the medication can be supplied in the glucose, thus a much more accurate dosage can be depended on.

Antipneumococcus serum type I, the antistreptococcus serum, or the antitetanus serum, can be administered in this glucose medium. This is far superior to saline,

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(2) Jour. Amer. Med. Ass'n, Nov. 29, 1919.
(3) Amer. Jour. Med. Sci., Oct., 1920.

for glucose will do much more than saline, thus being a much more rational medium to use as a diluent for any intravenous medication.

The use of glucose is strictly a physiologic measure and is to be used as such.

Having found that a solution containing over 5 per cent. of glucose does not produce hemolysis, he selected a 10 per cent. solution in distilled water for routine use. To such solution it is unnecessary to add salt. The quantity ordinarily injected is 250 c.c. which introduces about 100 calories into the system. In protracted cases, when it is desired to introduce as much food as possible, a 30 per cent. solution may be used. Such injections are not followed by glycosuria. The only disagreeable result noted is the occasional appearance of a chill, which however passes without harm to the patient. The author believes that the addition of morphine and atropine lessens the frequency of the occurrence of chill, but does not do away with them. He calls attention to the experience of H. D. Mosenthal who believes that commercial glucose is less likely to produce a chill than the chemically pure product, which in its purification is liable to retain traces of acetic acid.

The formula employed by him routinely is as follows:

Tincture digitalis	1.00000 c.c.
Morphine sulphate	0.00800 gm.
Atropine sulphate	0.00064 gm.
Glucose 10 per cent.	250.00000 c.c.

It is a good plan to prepare several 250 c.c. bottles, stopper them with cotton over which paraffin paper is placed, sterilize by boiling or autoclaving, then store on ice. The method of administration is the same as that of arsphenamine. Either a tube reservoir or else a three-way stop-cock with a 10 c.c. syringe can be used. In case of the latter, the original bottle serves as a reservoir. The latter is more practical for private practice, the former for hospital use.

Glucose administration should be commenced early, so as to preserve the patient's strength. Otherwise it will be disappointing. The author scores the morphinephobia of some physicians in connection with this disease. He believes that morphine should be used early, to save the patient's resources and fighting power, so that he may win the victory over the infection.

[I must confess that I belong among the "morphine-phobics" when it comes to the treatment of bronchitis or bronchopneumonia. I fear suppression of cough, retention of secretion, consequent interference with drainage, and invasion of the pulmonary parenchyma. In lobar pneumonia, on the other hand, where the spread of the infection does not occur by way of the bronchial tree, the use of morphine, when necessary, is beneficial—but I would not use it in a routine manner, as suggested by the author.—Ed.]

Hypertonic Glucose. To diminish intracranial pressure R. L. Haden[4] advocates intravenous injection of hypertonic glucose solution in cases of meningitis and other conditions of excessive intracranial pressure. He injects a 25 per cent. glucose solution every twelve hours, from the onset of the disease until there is no longer any evidence of increased intracranial pressure. These injections are given in addition to the specific treatment and lumbar puncture with drainage of the spinal fluid. If immune serum is given intravenously, the glucose solution may be given at the same time. The injection should be made slowly, so that one hour is consumed in administering 250 c.c. of a 25 per cent. solution. He reports two cases which seem to demonstrate beneficial effects from this treatment.

Saccharose Treatment of Pulmonary Tuberculosis. Winkler and Ladek,[5] after having tried the intramuscular injection of from 5 to 20 per cent. solution of sugar in a series of cases, failed to notice any effects except pain at the point of injection and transient fever.

WATER AND SALINE SOLUTION

The Intravenous Use of Saturated Salt Solution to Lessen Intracranial Tension. As Weed and McKibben have shown by experiments on animals that saturated

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(4) Jour. Amer. Med. Ass'n., Sept. 27, 1919.

(5) Wien. klin. Wochenschr., 1919; abstracted in Therap. Halbmonatsh., June 1, 1920.

salt solution (35 per cent.) injected intravenously causes the brain to shrink in volume, as a result of dehydration of the tissues, E. Sachs and George W. Belcher[6] employed this procedure after a cerebral decompression operation, in which the intracranial pressure was so great that the cortex ruptured at several places and the patient remained stuporous. He was given 100 c.c. of saturated salt solution intravenously, about 1 c.c. a minute. The result was startling. Before 15 c.c. had run in, the patient brightened up and answered questions. This improvement lasted about twelve hours, when the patient again relapsed into a semicomatose condition. On three successive occasions, administrations of the saturated salt solution improved the patient. After the third injection the individual recovered.

That the red blood corpuscles were not injured as a result of these injections, is shown by the fact that their fragility never varied beyond normal limits. During the first injection, the blood-pressure rose rather alarmingly from 150 to 185. Within a few minutes the patient expressed a desire to urinate, and the diuretic effect of the salt was quite striking.

In another case, the salt solution was injected during the course of operation and it reduced the intracranial pressure so that a tumor of considerable size in the temporo-occipital region could be removed. The patient made an uneventful operative recovery.

The solution has also been used to control cerebral edema, and the authors believe that it has decided value for this purpose. However, until we know whether there are any dangers and what they are, in the use of salt in such concentrations, it should be used guardedly. That its use in the closed skull may be attended by some danger, is suggested by a statement of Weed and McKibben's that they found some histologic changes when salt was injected and no trephine opening had been made.

[Compare this article with one on "Hypertonic Glucose," abstracted on page 90.—Ed.]

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(6) Jour. Amer. Med. Ass'n., Sept. 4. 1920.

Water Diet in Infancy. A. B. Marfan[7] points out that restriction to water rests and soothes the digestive apparatus, modifies the intestinal flora, replaces fluids lost by diarrhea, washes out the system by flushing the kidneys, and lowers fever by increasing the activity of the sweat glands.

The water should be pure, and boiled, and in quantity about that of the food the child has been previously taking. If the child does not care to take the water from a nursing bottle, the best way is to give the water by teaspoonfuls at frequent intervals, or ten or twenty drops may be slowly instilled in the mouth or lips from a dropper every five or ten minutes. Water diet is only a temporary expedient, for 12, 24, or 48 hours, never for more than three days, or the child will have to contend with the effects of inanition in addition to the disease.

Administration of Saline and Other Solutions to Infants and Children. John Aikman[8] points out that loss of fluid is more serious in children than in adults, because of the vomiting that so often accompanies grave illness, and because of the difficulty of giving water by mouth or rectal administration. Enemas are often promptly expelled, especially if there is diarrhea. The drip method is objectionable in children, because restlessness makes the retention of the tubes very difficult, and the child is more or less disturbed thereby, which interferes with his rest. There is always some doubt as to the amount absorbed.

Hypodermoclysis is objectionable in children, because the procedure is painful and causes restlessness. The amount that can be given is limited and absorption is slow.

Intravenous injection is of advantage, as an amount equal to one-sixtieth of the body weight can be introduced through the veins, even much more can be used if the loss of fluid has been extreme. However, excretion of the fluid begins at once; and if prolonged results are to be obtained it is often necessary to give repeated infusions. It is difficult to make an intravenous injection in a small, active infant, especially into the veins at the

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(7) Nourrisson, September, 1919.
(8) Jour. Amer. Med. Ass'n., Jan. 24, 1920.

elbow. In order to overcome this difficulty, intra-sinus injection has been devised. The fluid is injected through the anterior fontanelle directly into the superior longitudinal sinus.

Technique of sinus puncture: As the sinus lies from two to five millimeters from the skin, it can be easily entered if the fontanelle is not closed; at the posterior angle of the fontanelle the sinus is wider and deeper. The child is held prone on the table by an assistant, while the needle is introduced in the median line just in front of the posterior angle. If the child is quiet, it is very easy to withdraw blood or to introduce fluid. By means of a Luer syringe, rubber tubing, and a three-way cock any amount of fluid can be given without removing the syringe. The needle should be short. If a glass syringe is attached before introduction of the needle, constant suction may be maintained for the purpose of discerning when the sinus is entered. If negative pressure is not produced, blood will not flow so quickly, while the operator may push the needle through the inferior wall of the sinus, blood flowing only when the needle is withdrawn. This accident may also be avoided if the needle be introduced at an angle, directed backward. In children with a closed fontanelle, the external jugular vein can often be used successfully; or, still better, the injection may be made into the femoral vein.

Dr. E. T. Wentworth, who elaborated this method gives the following directions:

Technique of femoral vein puncture: "If the injection is to be made into the right femoral vein, the operator should stand to the right side of the patient, and with the fingers of the left hand palpate the femoral artery as it passes under Poupart's ligament midway between the anterior superior spine of the ilium and the symphysis pubis. The fingers cover the artery while a medium-sized intravenous needle is introduced into the vein just to the left of the finger tips. The needle may be pushed straight in or at an angle directed upward and backward. A syringe is attached to the needle, and constant suction is maintained until a flow of blood shows that the vein has been entered; the syringe can then be removed and the fluid introduced by gravity. If a Luer-Kaufman syringe with a glass offset is used, the solution can be introduced immediately through the syringe itself.'' By this method the intravenous administration to children of any age is greatly simplified. Arsphenamine can be given in this manner with little danger.

Intraperitoneal injection has proved superior to all other methods because of the ease and rapidity of the administration, the volume of fluid that can be given at one time, and the certainty that no fluid will be lost. The results from this treatment are remarkable.

Technique: ''The instruments needed are a medium-sized intravenous needle, an infusion bottle, and rubber tubing. The skin of the abdomen is carefully sterilized with tincture of iodine and alcohol. The skin and subcutaneous tissue are picked up between the thumb and forefinger, and the needle is introduced in an upward direction through the abdominal wall in the midline just below the umbilicus. Care must be taken to avoid piercing a distended bladder; and, while there is also danger of puncturing the intestine, there is no record of this accident. In cases in which necropsy was performed there was found a small hemorrhagic area in the abdominal wall and peritoneum, but no injury of serious importance. When the needle has passed into the peritoneal cavity, the solution is introduced by gravity. Warm physiologic sodium chloride solution in quantities of from 100 to 250 ml., in older children from 300 to 400 ml., may be given every twelve to twenty-four hours; in fact, if no untoward signs develop, fluid may be given until the abdomen becomes slightly distended. However, the injection must be made slowly in all cases, and overdistention of the abdomen must be avoided. After the operation, the abdomen is covered with a sterile dressing. It has been shown by the phenolsuphonephthalein test and by necropsy that from 40 to 60 per cent. of the fluid is absorbed in one hour. The remaining solution acts as a reserve, the gradual absorption of which explains the more protracted improvement as compared to results obtained by other methods.

Gum Saline Infusion. W. M. Bayliss[9] has studied the effects of 6 to 7 per cent. gum acacia solution in 0.9 per cent. sodium chloride, upon the circulation of experimental animals; and, in consequence, recommends it in states of low blood-pressure or decreased volume in circulation. It is superior to saline solution because the blood-vessels are impermeable to colloids, so that their osmotic pressure is effective in retaining within the circulation the solution that has been injected. As this solution has no chemical or drug-like action and does not produce anaphylaxis, hemolysis or hemagglutination, it can be used in large quantities. It is capable of effectively replacing blood lost by hemorrhage from various causes, unless the loss amounts to more than 75 per cent. of the blood volume. It has also been used with benefit when the blood volume is reduced owing to removal of a part from effective circulation by stagnation in the capillaries as happens in wound shock, traumatic toxemia, and probably in other similar conditions. When blood has become concentrated by loss of fluid from the body, gum saline is more effective than saline alone. However, neither gum saline nor blood has any permanent effect when the blood vessels are deprived of control by the vasomotor center or when the capillaries have become permeable to colloids by prolonged action of tissue toxins.

In the preparation of this solution, Bayliss recommends the use of tap water. For his experimental work on cats he has filtered the solution through glass wool and sterilized it by simple steaming. For use in human beings, filtration through a Buchner filter and sterilization in the autoclave as recommended by Telfer[1] is desirable.

Mineral Water in Intestinal Lavage. J. Baumann[2] finds the use of mineral water beneficial in intestinal lavage, especially in lesions of the mucous membrane of the large intestine, such as colitis, and most beneficial in certain cases of intestinal stasis, especially when high up in the transverse colon and accompanied by putre-

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(9) Jour. Pharm. and Exper. Therap., March, 1920.
(1) Spec. Report, Med. Research Com., 1919, No. 25.
(2) Prog. méd., July 17, 1920.

faction, fermentation and general intoxication. They are futile in ordinary constipation and in spasmodic constipation in which, oil or bile enemas are indicated. In mucous colitis, Baumann gives, two or three times a week, one liter at 37-38°C. and at a pressure of 15-20 cm., using the Murphy drip and allowing from 100 to 120 drops a minute. A pressure of 15-20 cm. will cause no discomfort and will prevent spasm. He obtains the best results with waters containing calcium and magnesium.

Intestinal stasis with its associated manifestations needs more vigorous treatment. He first gives a preliminary enema of 500 c.c. at 37° C., and at low pressure to evacuate the bowels and to prepare the intestine for a second lavage with 700-1000 c.c. given slowly, allowing 10 minutes for the operation, plus abdominal massage (masso-lavage). This empties the bowel of all waste products, etc. Such procedure, of course, is contraindicated in inflammatory conditions, such as appendicitis.

ALKALIES

Alkalies in Disease of the Upper Gastro-Intestinal Tract. Walter A. Bastedo[3] points out that we do not know how alkalies relieve the hunger pains in ulcer cases and in so-called hyperacidity. ''These hunger pains are attributed to hypermotility, but are not present during the most active contractions of the stomach, and may be present when there are no contractions. They are attributed to hyperacidity, but are not present when the highest acidity is present, and may appear when there is subacidity or anacidity. They are attributed to hyperesthesia, but are not brought out by the most vigorous peristalsis and the presence of food, and they are relieved by food and various substances which have irritant properties. We must, therefore, still consider that the cause of the hunger pains of ulcer or hyperacidity is not satisfactorily established, and that as a consequence we do not know how alkalies act to check them. We can feel satisfied, however, that *the relief of hunger pains by alkalies is not due merely to acid neutriliza-*

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(3) Amer. Med., Aug., 1920.

tion." To obtain relief, patients may require half a teaspoonful or even a full teaspoonful (4 to 8 gm.) of sodium bicarbonate at the time when the pain comes on, that is, three or four hours after meals. Much smaller doses suffice for relief if they are accompanied by some carminative, such as peppermint. A bedtime dose will often suffice to forestall all night pains. In distension cases sodium bicarbonate acts better than magnesia because of the carminative action of its liberated carbon dioxide. For pain due to adhesions alkalies can have little if any use.

Though greater doses of sodium bicarbonate than of calcined magnesia can be given, for the latter is very bulky and insoluble in water, weight for weight magnesia can neutralize four times as much acid as can sodium bicarbonate, and it does this more slowly and without production of gas. The heavy magnesia has the same neutralizing power, weight for weight, as the light, but it is from three to three and one-half times as dense.

Alkali in Epidemic Influenza and Bronchopneumonia. D. S. Hachen and R. Isaacs[1] find that these conditions are accompanied by a depletion in the alkali reserve and that there is a relation between the clinical course, the prognosis, and the alkali reserve of the blood. Those whose alkali reserve dropped below 46, in spite of alkali therapy by mouth, died. The alkali given consisted of sodium citrate, 2 gm. and sodium bicarbonate 2 gm., four times a day. Patients showing an alkali reserve of from 46 to 52, while receiving alkali therapy by mouth, had a doubtful prognosis, a fatal termination by bronchopneumonia being forecast by a drop in the alkali reserve, while a rise accompanied improvement. When death was due to meningitis, the alkali reserve was not always a significant clue, as was found in two cases. A favorable prognosis was noted in cases having an alkali reserve of 53 or above, except in cases of complicating meningitis. Generally a drop in temperature with a drop in alkali reserve was associated with a poor condition clinically. A rise of temperature, associated with a rise in alkali reserve, often accompanied a more hopeful condition. A drop in temperature, accompanied by

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(1) Jour. Amer. Med. Ass'n., Dec. 11, 1920.

a rise in the alkali reserve, marked convalescence. A rise in temperature with a drop in alkali reserve was of bad prognostic significance.

While these studies point to a relative inefficacy of alkali therapy by mouth, Hachen and Isaacs obtained rapid clinical improvement, especially quieting of dyspnea, after intravenous injection of from 500 to 600 c.c. of Fischer's solution (sodium bicarbonate, 0.371 per cent.; sodium chloride, 1.4 per cent.).

OXYGEN AND CARBON DIOXIDE

The Therapeutic Value of Oxygen in Pulmonary Disease. To determine the value of oxygen administration in pneumonia, J. C. Meakins[2] undertook an investigation to see whether oxygen adequately administered would increase the oxygen saturation of the arterial blood. His method consisted in finding the amount of oxygen that a known quantity of arterial blood would take up, proper precautions having been taken to avoid exposure to air before the estimation was made. Then the total oxygen capacity of the same sample of blood was determined, and the ratio between the two gave the percentage of saturation or rather unsaturation with oxygen of the arterial blood.

Using Haldane's[3] apparatus in two cases of pneumonia, and in one of acute exacerbation of chronic bronchitis, with dyspnea and cyanosis, a marked diminution in the oxygen unsaturation was obtained in all cases—10 to 17 per cent. was cut down to 2 or 3 per cent. With this, the cyanosis also disappeared.

In view of the fact that the unsaturation of these patients was reduced to below the normal, which had been found to average 5.1 per cent., the degree of unsaturation with oxygen before and after oxygen inhalation was determined in five normal individuals. It was found that by means of oxygen administration the same result could be obtained in normal individuals, the unsaturation having become depressed to below 2 per cent. in one case.

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(2) Brit. Med. Jour., March 6, 1920.
(3) Practical Medicine Series, 1919, Vol. VI, p. 120.

Carbon Dioxide after Anesthesia and Operation. Starting with the fact that carbon dioxide is Nature's own stimulant to the respiratory center, Y. Henderson, H. W. Haggard and Raymond C. Coburn[4] devised after ten years of effort an apparatus simple enough for clinical purposes (Fig. 12). It consists of a tank of carbon dioxide, and a reducing valve. From the valve the gas passes to a T-tube, one limb of which leads to capillary tube 1.8 mm. in diameter and 10 mm. long, and the other limb to a glass tube projecting down into a vessel of water. The latter serves both as a gage and as an escape valve, preventing any excessive pressure on the capillary. Under the maximum pressure possible, not more than 8 liters of gas pass through the capillary, which in turn is connected to the mask by a 5 or 6 mm. rubber tube. The construction of the mask involves the idea of preventing any possibility of accumulation of gas in the mask, with consequent excess administration. The opera-

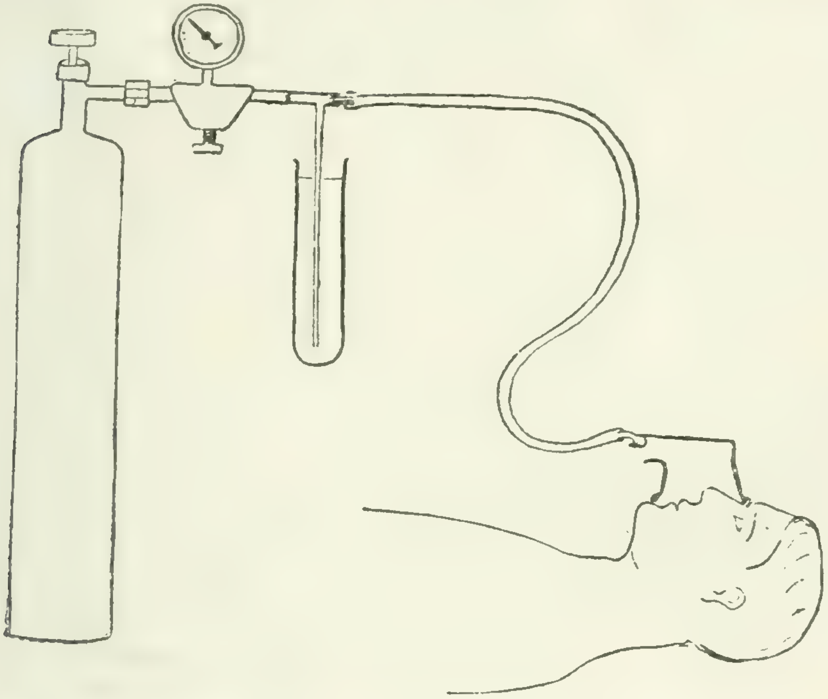

Fig. 12. Simplified apparatus for carbon dioxide administration.

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[4] Jour. Amer. Med. Ass'n, March 20, 1920.

tor controls the administration according to the reactions of the patient.

With this apparatus the authors studied the effects of administration of carbon dioxide after ether anesthesia and major surgical operations. They found that within a few minutes after the initiation of the inhalation of carbon dioxide there was a great augmentation of respiration. In control cases the volume of breathing was less than half the normal, hence the common cyanosis and slow elimination of the anesthetic. Under the inhalation of carbon dioxide, the volume of breathing was increased to amounts from 35 to 70 liters a minute, volumes corresponding to those which the subjects would have breathed under vigorous physical exertion, while a normal adult at rest breathes from 6 to 8 liters of air a minute. The greater part of the ether was thus rapidly ventilated out of the blood. In from fifteen to twenty-five minutes, the patient was conscious, although prone to emotional disturbances, sometimes of anger, but oftener of hilarity. Frequently, the patient fell asleep fifteen or twenty minutes after the termination of the inhalation. Presumably there was a slight secondary rise of ether in the blood due to continued diffusion from the muscles, adipose tissue, etc. Under inhalation of carbon dioxide the arterial pressure rose rapidly, sometimes 30 or 40 mm. within four or five minutes. After the termination of the inhalation, it returned to a practically normal value. It never fell appreciably thereafter.

To the observer, the return of the normal pink color of the skin, was one of the most striking effects of the inhalation of carbon dioxide, indicating a return of the normal capillary circulation. As the patients came off the operating table, they showed invariably the inadequately filled veins which indicate a reduced venous return to the right heart. Under inhalation of carbon dioxide, the veins became filled to an extent even exceeding that seen after vigorous physical exertion. Vomiting was much less than in untreated patients. The patients were allowed to drink water freely. The inhalations seemed to diminish greatly the usual post-anesthetic thirst. One of the benefits to be derived from inhalations of carbon dioxide will probably be found in the restoration of normal tonus in the stomach and intestine, and thus in the prevention of gas pains and constipation. No patient developed gas pains and all recovered normal bowel movements easily, though the total of only seventeen patients treated is not enough to warrant a definite conclusion on this point. The authors feel certain, however, that the inhalation of carbon dioxide properly diluted with air is a highly beneficial and, with care, a safe treatment after anesthesia and operation.

Intraperitoneal Injection of Gas and Increased Number of Red Blood Corpuscles. C. Goodman[5] finds that oxygen or nitrogen injected into the peritoneal cavity causes an appreciable increase in the number of red blood cells in the peripheral circulation, as demonstrated by the blood count. The increase amounts to from 80,000 to several hundred thousand. In two cases of splenomegaly it was 1,500,000 and 2,280,000. A case of pernicious anemia showed a net increase of 1,680,000 red blood corpuscles.

As we have no direct evidence that gas introduced into the closed peritoneal cavity has any direct stimulating effect on the hematopoietic organs it is doubtful whether the method is likely to be of value in the treatment of anemia. On the other hand, observations lead the author to believe that the gas acts as a splint by giving support and pressure to the larger venous trunks of the abdomen, and thus this procedure might possibly be utilized in the treatment of shock.

BLOOD TRANSFUSION

Technique. Geoffrey Keynes[1] is in favor of the citrate method carried out with the transfusion apparatus known as "Robertson's bottle," which has been modified by the author in the direction of simplicity, since in drawing the blood there is no necessity for creating a negative pressure, if a needle of a sufficiently large bore (2 or 3 mm.) be used (Fig. 13).

The needle should be kept ready for use in liquid paraffin, and after use should always be re-sharpened

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(5) Jour. Amer. Med. Ass'n., May 29, 1920.
(1) Lancet, June 5, 1920.

on a bevelled hone. When the donor's arm has been congested, and a suitable vein chosen (usually the median basilic), the area of puncture is infiltrated with novocaine; it is then only necessary to make a tiny cut in the skin with the point of a scalpel and to push the needle through into the vein. The blood is then allowed to flow through a rubber tube, which hangs freely into a flask (Fig. 14) containing the citrate (160 c.c. of a 3.8 per cent. solution); and, as it flows, it is thoroughly mixed with the citrate by gently swinging the flask. It is convenient to use a graduated conical flask provided with a side tube and holding about a liter.

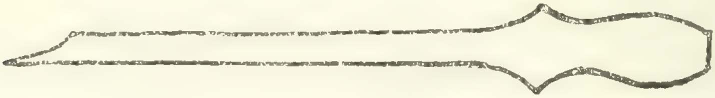

Fig. 13. Needle used for blood transfusion (full size). The bore should be 2 or 3 mm.

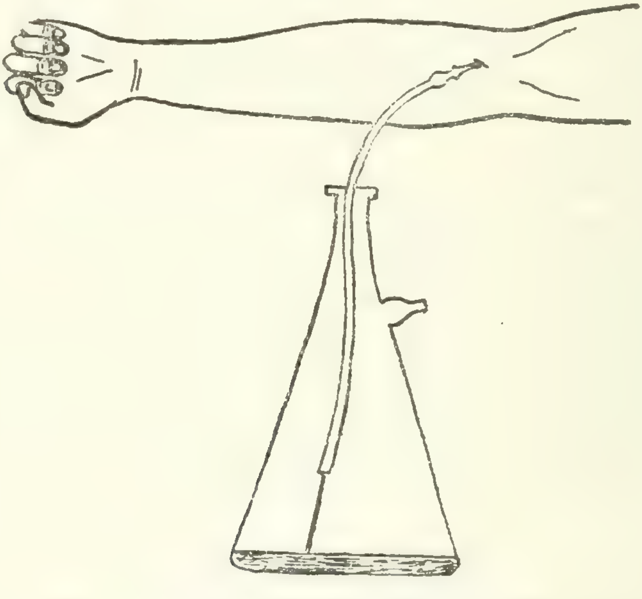

Fig. 14. Simple flask for blood transfusion.

If a properly adjusted tourniquet is kept on the donor's arm while he works his forearm muscles by clasping and unclasping his hand a flow of blood is obtained which is fast enough to prevent clotting in the needle. Blood up to 1000 c.c. can be collected in this way in from 10 to 20 minutes. As an additional precaution, a few drops of paraffin may also be run through the rubber tube before drawing the blood. The flask of citrated blood can then be stood in a basin of warm water, and put on one side until wanted, or taken to the patient's bedside. When the needle has been withdrawn from the donor's vein, slight pressure must be maintained for a few minutes on the puncture with a swab to prevent any bleeding, but no suture is needed.

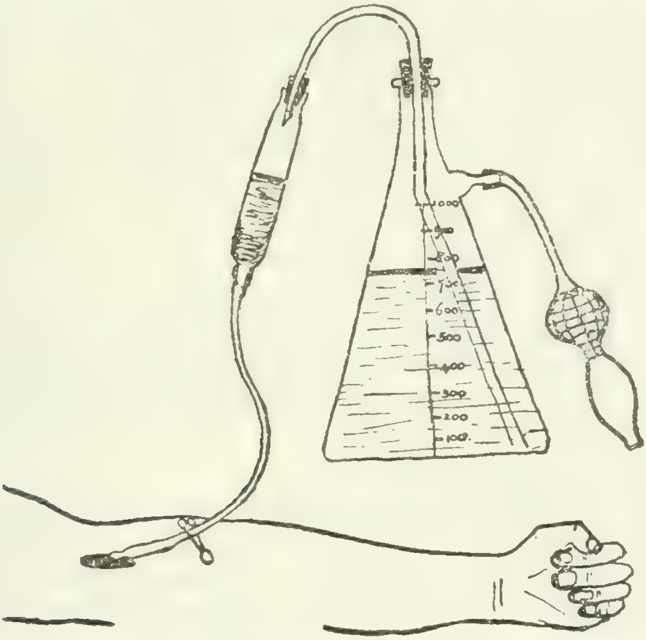

Fig. 15. Showing air-lock in delivery tube of transmission apparatus.

In the administration of the blood it is usually best to expose the median basilic or saphenous vein in the patient by an open operation. Direct introduction of a needle will sometimes be found difficult.

The author has found it a great advantage to fix on the delivery tube of the flask an air-lock, as shown in Figure 15, which is first filled with normal saline solution and the tube near the cannula is clipped. The cannula is then inserted in the patient's vein and tied in. The barrel is fitted on to the rubber bung through which the nozzle of the delivery tube projects, the clip is released, and slight positive pressure is produced in the flask by means of a rubber bulb attached to the side tube. The citrated blood rises in the delivery tube, displacing the saline solution in the air-lock to a lower level, and then flows from the delivery tube into the air-lock, displacing the rest of the saline solution, and so into the patient's vein.

The introduction of the air-lock has two advantages: in the first place, it allows of the cannula being filled with saline, so that during insertion in the vein there is no leakage of blood that would obscure the operation; in the second place, it is easy to regulate with nicety the time occupied in giving the blood and to be quite sure that it is flowing nicely. If the patient is suffering from acute anemia, 750 c.c. of blood may be given in the course of 20 minutes; but if the condition is one of chronic anemia due to a slow continuous oozing, the blood must be given much more slowly. It is dangerous in such cases to increase the blood volume rapidly, and three-quarters of an hour must be occupied in giving 500 c.c. The apparatus may also be used with advantage in giving saline or gum solution.

Blood Transfusion Apparatus. L. L. Stanley[2] describes the following ball valve apparatus (Fig. 16):

"When the plunger of the syringe is drawn out, the ball A engages in the socket, not permitting any fluid to pass it, while the ball C is displaced upward to position B, allowing the blood to come from the donor into the syringe. When the syringe is pushed in, the ball in the lower chamber engages the socket at C, preventing the fluid from returning to the donor. At the same time the ball A is released from its socket and assumes a position in the upper chamber at D, allowing the blood forced from the syringe to flow into the veins of the recipient.

"The donor and recipient are placed on adjoining tables, with the arm of the recipient slightly higher than that of the donor, for the balls engage by gravity, and the valve must be held in a vertical position. The syringe

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(2) Jour. Amer. Med. Ass'n., March 6, 1920.

is thoroughly sterilized, and the inside is coated with Ablemann's citrate ointment, which consists of:

	gm. or c.c.
Wool fat	10
Water	10
Sodium citrate	10
Petrolatum, to make	100

"With the syringe connected, enough physiologic sodium chloride solution is drawn in to displace any air, and leave a few cubic centimeters in the barrel. The cubital veins of both parties are located, and the tourniquets applied. The needle is first placed in the vein of the donor; and, when blood begins to flow, is connected with the apparatus at E. Similar procedure is carried out with the recipient; and when the connection is made at F the operator may pump the blood."

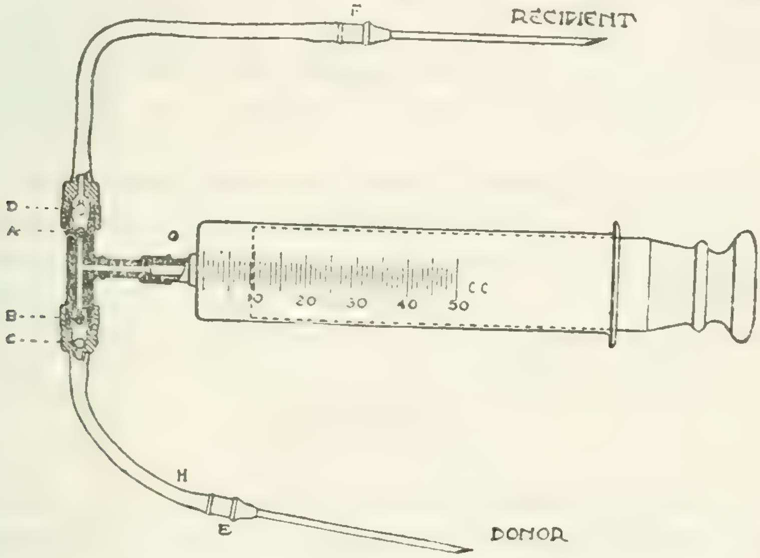

Fig. 16. Details of blood transfusion apparatus.

It is well to have two of these valves, one to replace the other quickly, in case the syringe should begin to work hard, or the blood begin to clot. Should it be desirable to give citrate solution with the blood, a buret with rubber tubing and a No. 28 hypodermic needle at the end is provided. The needle is plunged into the connecting tube at H.

By means of this apparatus many injections of arsphenamine are given. When the patients are ready, sufficient solution is prepared for as many consecutive injections as are required. Using a 50 c.c. Luer syringe, one dose is drawn from the mixing vessel through the donor's tube. This is more satisfactory than the gravity method, and saves considerable time.

George I. Miller[3] reports a somewhat similar instrument for blood transfusion, the valve of which may be called a shuttle, because one piece of metal rests on the other and slides back and forth. For description of the instrument, and the simple technique of the operation, the reader must be referred to the original article. No coagulation takes place owing to the rapid filling and emptying of the syringe—usually three to five times a minute. The blood remains pure and is not modified. The author has transferred 500 c.c. and 800 c.c. with one syringe. In cases in which he transferred from 1000 c.c. to 1200 c.c. at one time, he found it easier to use a second syringe. In addition to the use of the valve or shuttle for the blood transfusion either can be used in place of a Potain syringe in paracentesis and for similar purposes.

HEMOSTATICS

Efficiency of Thromboplastic Agents. P. J. Hanzlik and C. M. Weidenthal[4] revised and improved their experiments on the effects of thromboplastic agents upon hemorrhage; and, in this reinvestigation, obtained somewhat different results from those reported last year.[5]

The agents experimented with are in three groups:

1. *Thromboplastins.* These are saline extracts usually of brain, containing a large quantity of protein, presumably also some kephalin, possibly ferments, salts, etc. This preparation, first introduced by Hess, is now marketed under the name of Thromboplastin by at least two firms (Squibb and Armour). Both of these preparations

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(3) New York Med. Jour., March 13, 1920.
(4) Jour. Exp. Pharm. and Therap., October and November, 1919.
(5) Practical Medicine Series, 1919, Vol. VI, p. 116.

were used in the experiments the results of which are reported.

2. *Kephalin.* This is a lipin, apparently of fairly definite composition, prepared by ether extraction of brain substance. It is insoluble in water but swells like lecithin, forming an emulsion or colloidal suspension. Armour's product and some prepared in the laboratory were tested.

3. *Serum products.* To this class belong coagulen (Ciba), and coagulose, and hemostatic serum (Parke, Davis and Co.).

By means of experiments, *in vitro,* Hanzlik and Weidenthal found that the thromboplastins tested shortened coagulation time to one-twentieth or one-tenth as compared with normal saline. They were the most efficient of the substances tested. The kephalins shortened coagulation time to one-third or one-half, kephalin being therefore only one-seventh to one-third as active as thromboplastin. The serum products tested, including coagulose, coagulen, and hemostatic serum did not accelerate clotting. Therefore these are inert as thromboplastic agents.

The range of optimum concentrations of kephalin for hastening the coagulation time of plasma is from 0.06 to 1 per cent. Outside of these limits coagulation is retarded. On the other hand, coagulation is accelerated in case of the thromboplastins proportionately to their concentration. This indicates a difference in mechanism of action.

Both kephalins and thromboplastins lose their thromboplastic activity on standing. A thromboplastin thirty-two months old, and a kephalin seven years old were entirely inactive. Deterioration of kephalin is demonstrable at the end of about two months. Thromboplastin from nine to twenty-two months old possessed from about one-eighth to one-third the activity.

The hemostatic efficiency of the thromboplastic agents tested by irrigation on superficial hemorrhage from the dog's pad agrees in general, with their power to accelerate coagulation of blood *in vitro.* Therefore, thromboplastin and kephalin are the most active; the serum products were found either inactive or doubtful. The results obtained after the application of various thromboplastic agents to dissected femoral arteries bleeding into Scarpa's triangle, to bone and liver wounds gave unsatisfactory results; and, on the whole, were negative and not supporting the claims made for it.

When dogs are bled at intervals, this procedure in itself so markedly and promptly shortens coagulation time, that it is impossible to arrive at any definite conclusion concerning the thromboplastic activity of agents administered systemically.

The thromboplastic agents rich in protein, such as thromboplastin and hemostatic serum, are distinctly harmful to guinea-pigs, producing when injected anaphylactoid phenomena. Caution is therefore necessary when administering these agents intravenously or subcutaneously. Kephalin appears to be relatively harmless.

The authors report prompt stoppage of intestinal hemorrhage in a hemophilic after the oral administration of 4 gms. of kephalin. There was also a shortening of the coagulation time and the bleeding time of ear blood. This must not be interpreted as necessarily due to kephalin since bleeding in this patient was known to have stopped spontaneously before treatment.

Cotarnine (Stypticin and Styptol). According to a report of the Council on Pharmacy and Chemistry of the American Medical Association,[6] salts of the base cotarnine which have been advocated as local and systematic hemostatics, have been omitted from New and Nonofficial Remedies, 1920, because the evidence for the usefulness of the cotarnine salts has been contradictory and unsatisfactory, and a thorough investigation of the subject undertaken by P. J. Hanzlik[7] has furnished conclusive evidence for the inefficiency of cotarnine salts as hemostatics.

RESTORATIVE ORGANOTHERAPY

Corpeus Luteum in Hyperthyroidism. H. H. Hoppe[8] claims that corpeus luteum brings notable and rapid improvement in the treatment of hyperthyroidism, especial-

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(6) Jour. Amer. Med. Ass'n., Nov. 22, 1919.
(7) Practical Medicine Series, 1919, Vol. VI, p. 117.
(8) Jour. Amer. Med. Ass'n., July 17, 1920.

ly on the part of the cardiovascular symptoms and the general nervous manifestations. He usually gives:

℞	gm. or c.c.
Corpus luteum	4.00
Quinine hydrobromide	6.00
Extract of belladonna	0.20

Mix and divide into 30 capsules.
Label: One after each meal.

On improvement the dosage is reduced to two capsules a day and then to one dose at bedtime. The theory on which this treatment is based is that hyperthyroidism and hypo-ovarianism are synonymous conditions.

[The validity of this theory would be more satisfactorily established if the corpus luteum were given unassociated with the other remedies, which by themselves are frequently useful in hyperthyroidism.—Ed.]

Epinephrine in Influenza. Epinephrine would seem to be a logical remedy against the asthenia of influenza and influenza pneumonia, in view of the fact that degeneration of the suprarenal gland has repeatedly been found in these conditions. Furthermore, D. M. Cowie and P. W. Beaven[9] found a prolonged rise in blood-pressure and a prolonged blood-sugar curve after a lengthy administration of epinephrine, all of which would indicate suprarenal dysfunction. However, in practice, these authors decide that epinephrine has been decidedly disappointing; and they conclude that, as in case of Addison's disease, the proper method of administration has not yet been found.

Adrenal Gland in Addison's Disease. H. Quincke[10] reports two cases of Addison's disease occurring in old men after a long time passed on miserable food and with poor shelter, who under good care and prolonged treatment with dried adrenal gland tablets (Merck's, each equivalent to 0.1 gm. three times daily), not only improved in general, but even lost most of their pigmentation. The author considers the total adrenal gland superior to epinephrine, as the former probably contains other active ingredients as well.

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(9) Archiv. Int. Med., July, 1919.
(10) Therap. Halbmonatsh., Jan. 15, 1920.

SPECIFIC IMMUNIZATION

Biologic Therapy. A very timely series of articles dealing with serums, vaccines and non-specific immunization has been prepared under the auspices of the Council on Pharmacy and Chemistry of the American Medical Association. The Council appointed a committee consisting of L. G. Rowntree, G. W. McCoy, and Warfield Longcope, which enlisted the aid of authorities in immunology to prepare these articles.

A general survey of the whole subject is given by Simon Flexner.[1]

Diphtheria antitoxin is still the outstanding example of a therapeutically active serum, while tetanus antitoxin has a high protective but a lower therapeutic value. These two antitoxic serums are made from the poisons given off by the growing bacilli. Most of the infectious diseases, however, are induced not by these soluble and readily released toxins, but by poisons or toxins held by, or closely bound to, the bacterial bodies themselves. This endotoxin as contained in different bacteria acts in a very capricious manner. Thus, in the form in which it exists in the typhoid bacillus, it does not lend itself well to the making of an antiserum; as it exists in the dysentery bacillus it lends itself somewhat better to this purpose; as it exists in the meningococcus it lends itself better still; while as it exists in the various cocci-pneumococcus, streptococcus and staphylococcus—it hardly lends itself at all. The point of capriciousness is illustrated best by considering the special instance of the pneumococcus. A therapeutically active serum has been produced from Type I pneumococcus, while against others no useful antiserum has as yet been developed. To go beyond this simple demonstrable fact and to attempt to treat pneumococcus infection by use of so-called ''polyvalent'' antipneumococcus serum is not only futile; but, in the present state of knowledge, unscientific.

Bacterial vaccines thus far have demonstrated their usefulness in the prevention of typhoid fever, and in a less degree of cholera and bacillary dysentery, and they

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(1) Jour. Amer. Med. Ass'n., Jan. 1, 1921.

may have an application to the prevention of the type pneumonias when these affections become, as they rarely do, epidemic. Bacterial vaccines also have a limited therapeutic application in certain types of local infection, as furunculosis. Their wider employment, or the employment of similar products, in the treatment of acute generalized infections is to be resorted to, if at all, with great caution. The idea that vaccines can be used to combat generalized infections, because when injected under the skin they utilize the local tissues to elaborate healing immunity substances (antibodies), is a mere hypothesis that has never been verified. The lymphatic internal organs are the only ones known to be active in producing them, and hence the inoculation of killed cultures or "vaccines" in acute infections may merely amount to the adding, as it were, of fuel to the flames. And what in this respect is true of bacterial bodies as a whole, as they exist in the vaccines, is true also of extracts or other preparations made from them.

Antitoxin in Diphtheria. William H. Park[2] emphasizes the fact that antitoxin, unlike most remedies, is slowly absorbed into the general blood stream when given subcutaneously. An intramuscular injection is absorbed about three times as rapidly. An intravenous injection makes the whole amount of antitoxin immediately available. As it is necessary for antitoxin to enter the blood stream before it passes to the tissues that are in contact with the toxin, it is evident that the intravenous method has an immense advantage. Antitoxin remains in the body for several days. This persistence of the antitoxin in the blood for a number of days is not grasped by most physicians. To this misunderstanding is due the use of multiple doses. A single dose of sufficient quantity is all that is required in any case. If the first dose is sufficient, later injections, though not harmful, are useless. An insufficient first dose, however, can not be wholly compensated for by later injections. Founded on the foregoing considerations, the directions for the use of antitoxin may be condensed as in the accompanying table:

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(2) Jour. Amer. Med. Ass'n., Jan. 8, 1921.

AMOUNT OF ANTITOXIN IN THE TREATMENT OF A CASE

	Mild Cases Units	Early Moderate Units	Late Moderate and Early Severe* Units	Severe and Malignant* Units
Infants, 10 to 30 lbs. in weight, under 2 years.	2,000 to 3,000	3,000 to 5,000	5,000 to 10,000	7,500 to 10,000
Children 30 to 90 lbs. in weight, under 15 yrs.	3,000 to 4,000	4,000 to 10,000	10,000 to 15,000	10,000 to 20,000
Adults, 90 lbs. and over in weight...	3,000 to 5,000	5,000 to 10,000	10,000 to 20,000	20,000 to 50,000
Method of administration advised.	Intramuscular	Intramuscular	Intravenous	Intravenous

*When given intravenously, the smaller amounts stated.

In cases of any severity in which diphtheria is suspected, and in cases of croup, it is far better to administer the remedy at once, making a culture at the same time, than to delay the treatment until a diagnosis has been verified by bacteriologic examination. One large dose given early is far more efficacious than the same amount in divided doses. Antitoxin for intravenous injection should be highly potent and show no turbidity. It must be warmed to the body temperature and given very gradually. One minute should be allowed for the injection of each cubic centimeter.

Immunization against diphtheria may be obtained by the subcutaneous administration of from 500 to 1,000 units, but the protection does not last longer than from two to four weeks. The injection should be repeated if danger of infection persists longer than three weeks. Before immunizing members of a household exposed to diphtheria, it is often advisable to determine by the Shick test whether they have natural immunity and are therefore not in danger of contracting the disease. Three toxin-antitoxin injections produce permanent immunity in about 90 per cent. of the nonimmunes.

Deleterious effects are probably not due to the antitoxin as such but to the accompanying globulin. Complete recovery always ensues excepting in very rare cases, chiefly and perhaps wholly in cases of status lymphaticus. About one death has occurred for every 70,000 persons injected, and these deaths, with possibly two exceptions, have followed the first serum injection. The fear of repeating a serum injection because of having sensitized the patient is almost wholly groundless. If it is necessary to give antitoxin to persons who are liable to attacks of asthma, it is well to give it in divided doses. One-tenth cubic centimeter of serum every fifteen minutes is usually borne without disagreeable effects.

Tetanus Antitoxin. Matthias Nicoll[3] thus summarizes the preventive treatment: In every case of open wound accompanied by laceration and crushing of tissue, of punctured wounds, that can not be thoroughly sterilized, bullet wounds, blank cartridge wounds, or any wound into which city dirt or garden soil has been visibly or probably ground, an immunizing dose of tetanus antitoxin of 1,000 units should be given subcutaneously (500 units in case of young children), the wound at the same time receiving thorough surgical treatment. In those cases in which the wound continues to slough or show signs of infection, and in gunshot and deep-seated wounds in which the condition of the wound tract can not be definitely determined, the dose should be repeated within a week, and in certain cases again repeated after the same interval.

In the curative treatment of tetanus the value of antitoxin depends directly on the promptness and method of administration. Every hour lost after the development of symptoms adds to the gravity of the prognosis. The subcutaneous method of administration is of extremely doubtful value; the intravenous method, even when massive doses are thus given, has proved disappointing, while the value of the intraspinal method has been demonstrated beyond question. Every patient, especially with the history of a wound, however slight, but also without any such obtainable history, who presents the symptoms of a stiff jaw, or tonic spasm of the abdominal muscles causing a boardlike resistance to the touch, unless such symptoms can be definitely accounted for otherwise than by tetanus infection, should receive as soon as possible an intraspinal dose of tetanus antitoxin of not less than 10,000 units, this dose to be re-

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(3) Jour. Amer. Med. Ass'n., Jan. 8, 1921.

peated within twelve hours, and again repeated in twenty-four hours if symptoms continue. With the first intraspinal dose it is advisable to give an intravenous dose of 5,000 or 10,000 units, with the object of immediately neutralizing any toxin present in the blood. Further use of antitoxin is of doubtful value.

Value of Prophylactic Injections of Antitetanus Serum. In the Paris letter published in the *Journal of the American Medical Association,* Sept. 4, 1920, an abstract is given of the discussion of this subject at the fifth International Congress of Surgery. Dr. Sieur finds that the greater the number of injections, the lower the mortality rate. In patients with two protective injections, the percentage of deaths was 77; with three injections, 33. Besides it should be taken into consideration that in inoculated individuals the tetanus is often partial or mild (*tétanos fruste*) and susceptible of cure.

Dr. Prothérat, while admitting the value of prophylactic serum injections, considers local treatment of the injured focus, where the toxin is elaborated, as the very basis of all prophylaxis. It was due as much to insufficient treatment of the wound as to the absence of a sufficient quantity of serum that so many cases of tetanus were seen early in the war.

Arndt of Berne reported that for more than fifteen years he used systematic prophylactic injections of serum (in three doses on the first, fifth, and tenth days) and *débridement* of the wound. Nevertheless he has had three cases of tetanus, and each time the necropsy revealed that this was due to insufficient cleansing of the wound area and the retention of a small foreign body, enough to explain the development of the tetanus.

[The British Tetanus Committee arrived at practically the same conclusions as was noted in the Practical Medicine Series, 1919, Vol. VI, p. 135.—Ed.]

Serum Treatment of Bacillary Dysentery. Simon Flexner[4] discusses the serum treatment that has reduced the mortality of this disease from 1/5 to 1/10 of the ordinary rate. Two groups of dysenteric bacilli exist, and the horse is subject to immunization both with the Shiga and with the Flexner group of bacilli. The

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(4) Jour. Amer. Med. Ass'n., Jan. 8, 1921.

serum obtained may be applied separately in the treatment of dysenteries induced by the Shiga or Flexner bacilli, respectively, or after mixing together in cases of bacillary dysentery in which the particular infecting bacillus has not been determined. Such a mixed serum yields the so-called polyvalent antidysentery serum. The antiserum is, as a rule, injected subcutaneously, but may be injected intravenously when indicated in very severe cases.

The average dose for an adult is 20 c.c.; for a young child 10 c.c. But in very severe cases, the dose, given intravenously, ranges from 50 to 100 c.c. The effects of the injection of the serum tend to appear promptly. They consist first in the amelioration, often within a few hours, of the nervous symptoms and the general prostration. According to the severity of the attack, the stools return to normal in from two to five days. In severe cases, the dose may need to be repeated in from twelve to twenty-four hours, and again in forty-eight hours. Chronic cases and the recrudescences in the course of chronic dysentery do not, as a rule, respond to serum.

The polyvalent antidysentery serum may be used to prevent infection with dysenteric bacilli. The usual prophylactic dose is 5 c.c., injected subcutaneously. The protection thus afforded endures only twelve to fourteen days. Bacillary dysentery is not preventable by vaccination as is typhoid fever, because of the severe local reaction that the injection of killed cultures of dysenteric bacilli sets up.

The Serum Treatment of Acute Poliomyelitis. Harold L. Amoss[5] presents the following facts in connection with this topic. At present persons who have recovered from an acute attack of poliomyelitis constitute the only available source of serum for treatment. As the collection and testing of serum require considerable time, the treatment is scarcely adapted to the sporadic disease. The convalescent serum should be administered either intraspinally alone, or, as seems better, both intraspinally and intravenously at the same time, early in the course of the disease and during the febrile period. The best re-

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(5) Jour. Amer. Med. Ass'n., Jan. 8, 1921.

sults were obtained with serum from persons who had passed through an attack of the disease from six weeks to two years previously. The serum separated from the clotted blood is inactivated at 55° C. for one hour and tested for sterility, then transferred to small sterile bottles.

The administration of serum after the febrile period has passed is of doubtful value; hence, it is desirable that during epidemics a microscope be carried to the bedside, and while the needle is still in place during lumbar puncture the fluid be examined for cells and globulin. If the diagnosis of poliomyelitis is regarded as positive, the intraspinal injection of serum may be given immediately through the same needle, without a second lumbar puncture. The amount injected varies according to the amount of spinal fluid withdrawn and the estimated pressure. The amount of fluid in cubic centimeters less 10 is the amount of serum to be injected by the gravity method, unless the pressure of the fluid is very great at the moment of lumbar puncture, when correspondingly less should be given. The serum should be warmed to 38° C. before injection.

After the intraspinal injection is accomplished, warmed serum (38° C.) is injected into one of the arm veins or, in small children, into the jugular vein. The amount to be given ranges from 40 c.c. in children up to 2 years to correspondingly larger amounts in older children; a child of average weight at 9 years should receive from 80 to 100 c.c. While it is inadvisable to use serum even slightly tinged with hemoglobin intraspinally or intravenously, it may be given subcutaneously. Deeply colored serum should be discarded. The intraspinal and intravenous injections may be repeated after twenty-four hours if the temperature has not approached normal.

Antimeningococcus Serum. The treatment of epidemic meningitis has been revolutionized by the specific serum. Kenneth D. Blackfan[6] presents the following fundamental principles to be kept in mind in order to secure best results:

The serum should be injected as early as possible in the course of the disease. It should be injected into the spinal canal or into the ventricles or both, so that it comes directly in contact with the meningococcus. The chief action of the serum is to destroy the organism. For this reason, it must be constantly present in as great a concentration as possible. Therefore it should be injected at frequent intervals and in as large amounts as are safe.

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[6] Jour. Amer. Med. Ass'n., Jan. 1, 1921.

In a suspected case of meningitis, lumbar puncture should be performed; and, if a cloudy fluid is obtained, antimeningococcus serum should be administered without waiting for the bacteriologic report. In the cases of average severity, the injection should be repeated every twenty-four hours for three or four doses. In cases of greater severity the injection should be repeated every twelve hours for three or four doses, and thereafter every twenty-four hours. Even with improvement in the general condition of the patient and after the disappearance of visible organisms from the spinal fluid, it is advisable to give two or three successive doses to guard against a relapse. The persistence of the meningococci in the cerebrospinal fluid necessitates the continuance of daily injections of serum until the organisms have been destroyed. After the serum treatment has been discontinued, lumbar puncture should be performed after an interval of several days, and cultures and cytologic studies of the cerebrospinal fluid made.

After the institution of treatment, if the symptoms persist or reappear, even with failure to demonstrate organisms, or if it becomes impossible to obtain cerebrospinal fluid by lumbar puncture, the possibility of a hydrocephalus should be considered, and the serum injected into the ventricle, through the open fontanel or a trephine opening at twenty-four hour intervals. When possible, the serum is injected intraspinally as well.

The amount of serum injected should never exceed the amount of cerebrospinal fluid withdrawn. The amount for adults is from 30 to 60 c.c. In infants and children the amount varies from 10 to 20 c.c., or from 5 to 10 c.c. less serum than the amount of cerebrospinal fluid withdrawn. When only small amounts of cerebrospinal fluid are obtained, not more than 5 c.c. in children or 10 c.c. in adults should be injected.

The proper method of introducing the serum into the lumbar subarachnoid space and into the ventricle is the gravity method. The injection of serum with syringe is not recommended. The lumbar puncture needle should be left in place for a few minutes after the serum has been given, so that the fluid may be removed quickly should alarming symptoms arise, such as irregular and rapid pulse, cyanosis, rapid and feeble respirations, and cessation of respiration. If these occur, cerebrospinal fluid should be withdrawn, artificial respiration resorted to, and stimulants given. Too rapid or too complete removal of cerebrospinal fluid also may be followed by collapse.

The intravenous injection of the serum is a logical procedure when the cases are recognized during the premeningitic stage of the disease. The diagnosis at this stage of the disease is difficult to make, and except in the midst of epidemics the vast majority of cases are not recognized before the development of the meningeal symptoms. It would seem rational and advisable to give serum intravenously in all cases were it not for the fact that the intravenous injection of antimeningococcus serum is associated invariably with a severe systemic reaction. In children death may be hastened by its use, and for that reason intravenous administration of serum in children should not be employed except in meningococcemia. Extreme care should be exercised when the serum is administered intravenously either to children or adults. The procedure advised is as follows: The patient first should be desensitized by a subcutaneous injection of 1 c.c. of serum. One hour later, from 80 to 150 c.c. (the dose for children is modified accordingly) is injected into the vein. The first 15 c.c. is injected by syringe or gravity method at the rate of 1 c.c. a minute. After that the serum is injected more rapidly. The injection is repeated according to the severity of the symptoms every twelve to twenty-four hours until the process has subsided. If symptoms (cyanosis, rapid pulse and collapse) occur, the injection should be discontinued and the attempt repeated later. The alarming symptoms are combated by 1 c.c. of epinephrine chloride, 1:1,000 solution, and 1/100 grain of atropine by hypodermic injection. Treatment by the intraspinal method should be continued together with the intravenous method. In the treatment of the complications of meningococcus infection, such as arthritis and pericarditis, the antimeningococcus serum should be brought into direct contact with the infecting organisms.

Antipneumococcus Serum. According to Rufus Cole[7] we have evidence that the serum of horses immunized to Type I pneumococcus is of great value in the treatment of cases of pneumonia due to Type I pneumococci. Hence, it is important that in every case of lobar pneumonia the type of pneumococcus concerned should be determined at once. The so-called mouse method is the best for determining the type.

The serum is injected intravenously, from 90 to 100 c.c. at the first dose and this should be repeated every eight hours until the fall of temperature and amelioration of symptoms indicate that the infection has been overcome. Severe cases may require as much as 1,000 c.c. The mortality rate in cases of lobar pneumonia due to pneumococci, Type I, not treated with serum has been shown to be from 25 to 30 per cent. or higher. Among 495 cases treated with serum the mortality rate has been 10.5 per cent.

To determine whether hypersensitiveness exists, it is well to inject intradermally 0.2 c.c. of a 1:10 dilution of horse serum with a control injection of an equal amount of physiologic sodium chloride solution. If sensitiveness is present, usually within five minutes a genuine urticarial wheal develops.

"In all patients before the administration of therapeutic doses of antipneumococcus serum, it is also well to inject from 0.5 to 1 c.c. of serum subcutaneously a few hours before the intravenous injection. This will serve to overcome slight degrees of hypersensitiveness. If, however, it is found that marked hypersensitiveness exists, it is necessary to resort to slow desensitization. This is effected by injecting small amounts of serum, at first subcutaneously, beginning with 0.025 c.c. and doubling the dose every half hour until 1 c.c. is given; then injecting 0.1 c.c. intravenously and doubling the

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(7) Jour. Amer. Med. Ass'n., Jan. 8, 1921.

dose every half hour until 25 c.c. can be given without untoward reaction. Four hours later, 50 c.c. may be given; and finally, after an interval of eight hours, treatment may be continued in the usual manner. Fortunately, it is rarely necessary to resort to this tedious procedure. In all patients it is well to give the first part of the first intravenous injection very slowly; this will serve as a desensitizing measure as well as an added means of detecting hypersensitiveness. In order to combat promptly any severe anaphylactic symptoms, the physician should be prepared to inject 0.6 c.c. (10 minims) of 1:1,000 epinephrine.

Pneumococcus Vaccine. Russell L. Cecil[8] considers prophylactic vaccination against pneumonia indicated whenever large groups of individuals are living together under abnormal conditions, as in army camps, in which carefully controlled observations shows the weekly incidence rate for pneumonia of all types among the vaccinated to be conspicuously lower than that for the unvaccinated. When pneumococcus vaccine was tested as a prophylactic against experimental lobar pneumonia in monkeys it was found that large subcutaneous or small intravenous doses of pneumococcus vaccine produced a complete immunity. Industrial workers who are exposed to the cold and wet, also firemen and policemen, might be vaccinated against pneumonia with advantage. In certain persons, who are susceptible to pneumonia and suffer from repeated attacks of the disease, a polyvalent pneumococcus vaccine would probably prevent further attacks of the disease.

There is very little experimental evidence in favor of a therapeutic value of pneumococcus vaccine in the treatment of lobar pneumonia. The greatest caution must be observed in the acceptance of clinical reports as in a disease of so varied and uncertain a clinical course as lobar pneumonia it is a matter of great difficulty to be certain that a favorable or unfavorable outcome in a given case is the result of the giving or withholding of vaccine or other proposed remedial agent. In subacute pneumococcus infections, such as unresolved

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(8) Jour. Amer. Med. Ass'n., Jan. 15, 1921.

pneumonia, sinusitis or bronchitis, pneumococcus vaccine may be of therapeutic value.

Pneumococcus vaccine is contraindicated in acute infections and in chronic pulmonary tuberculosis and nephritis. It should not be administered in large doses to patients with chronic cardiac disease, or to invalids, or to pregnant women after the fifth month.

Pneumococcus vaccine is almost always administered subcutaneously. Intracutaneous injections may excite severe local reactions; and, if injected intravenously, it induces a sharp constitutional reaction. Under ordinary circumstances, the intravenous injection of pneumococcus vaccine is strongly contraindicated. For therapeutic purposes, pneumococcus vaccine is administered in doses varying from 10 to 1,000 million pneumococci, or even more. For prophylaxis, much larger doses are used. In the U. S. Army three injections were given at seven day intervals, the first dose 3 billion, the second, 6 billion, and the third, 9 billion. The reactions to pneumococcus vaccine were similar to those following injections of typhoid vaccine.

Antistreptococcus Serum and Streptococcus Vaccines. According to George H. Weaver[9] antistreptococcus serums have not proved of great value, and the routine treatment of all cases of streptococcus infection with serum is not desirable. The serum appears to owe its activity largely to the specific opsonins which are not present in high concentration, consequently only large doses of serum can be expected to possess therapeutic activity. As, in addition to the opsonins, active leukocytes are essential in the process of destruction of the streptococci, it is very important that treatment be instituted early. It might be desirable to have serums prepared from each type of streptococcus for, as polyvalence increases, the curative power over each individual strain is less. Favorable conditions for the use of serum exist in local infections in which the serum may be brought directly in contact with the bacteria, as in wounds, meningitis, pleuritis, etc. In general infections, the harm from severe intoxication from large doses of foreign serum must be carefully balanced against

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(9) Jour. Amer. Med. Ass'n., Jan. 1, 1921.

the possible benefit secured. When this is done, very few patients with general streptococcus infection will receive the serum.

Streptococcus vaccines should always be autogenous. There is nothing to say in favor of a polyvalent streptococcus vaccine. In multiplying the strains, the quantity of each becomes so reduced that the essential one, if present, is in such small amount as to be without therapeutic effect.

In sub-acute and chronic local streptococcus infections, autogenous vaccines, given subcutaneously, sometimes act very favorably. The initial quantity should be small, from 10 to 20 million. Streptococcus vaccines are contraindicated in acute and general infections. In these circumstances the body is already exerting all its powers to produce an antibody to counteract the infection. The addition of still more bacterial toxin results only in harm. In streptococcus septicemias, vaccines are useless.

Gonococcus Vaccine. John T. Geraghty[1] is convinced that gonococcus vaccine or any of its modifications is utterly useless in the treatment of acute or chronic gonorrheal urethritis. The occasional symptomatic relief in epididymitis and arthritis is not the result of specific action, and the benefit derived is not proportional to the risk incurred.

In evidence that non-specific proteotherapy is as good or better, Geraghty offers the use of horse serum.

"In acute gonorrheal epididymitis, the intramuscular use of horse serum is followed in about 50 per cent. of the cases by a rapid subsidence of pain and tenderness. From 5 to 15 c.c. of serum is usually injected deep into the lumbar or gluteal muscles. In cases reacting favorably to this treatment there is marked symptomatic improvement in from three to five hours. It should be noted, however, that it exerts no influence whatever on the pathologic process in the epididymis, and resolution is not accelerated, nor does it alter the course of the urethral infection.

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(1) Jour. Amer. Med. Ass'n., Jan. 1, 1921.

Rabies Vaccine. This is discussed by A. M. Stinson[2]. The substance to be used for injection consists of a liquid suspension of more or less modified fixed virus; and this is administered in a series of subcutaneous injections, given for a period of time which may vary according to the method used, up to a maximum of three weeks.

There is a mass of experimental data to show that rabies vaccine does accomplish a specific immunizing effect. However, its administration is not entirely devoid of danger. In a very small proportion of those receiving it, a paralytic condition develops which may fairly be attributed to the treatment *per se*, or to a combination of this with a peculiar susceptibility of the patient. About one-fourth of these cases end fatally, a complete recovery usually occurring in the remainder. Rabies vaccine is now available throughout all portions of the United States to the extent that it may fairly be said that no exposed person need die of rabies for lack of injections.

Vaccination Against Typhoid and Paratyphoid Fevers. F. F. Russell and H. J. Nichols[3] report on the technique of this vaccination, the value of which has been repeatedly demonstrated. Though the protection is not absolute, the results are as good as if not better than those obtained against smallpox with vaccinia.

At present a triple typhoid vaccine is used which contains 1,000 million typhoid bacilli and 750 millions of each of the two paratyphoids in each cubic centimeter. The vaccine is regularly given in three doses, a week to ten days apart. Lipovaccines that could be administered at a single dose have given a response that is greatly inferior.

The best time of day for administration is about 4 in the afternoon, because if a general reaction supervenes, the greater part of it will be over before the next morning. A local reaction is almost always present. The general reaction may be absent or mild or severe. These reactions ordinarily subside in a few days, and leave no sequelae. The vaccine must always be administered

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(2) Jour. Amer. Med. Ass'n., Jan. 22, 1921.
(3) Ibid., Jan. 15, 1921.

subcutaneously, and never into the skin or into the muscles or veins. In the latter localities, absorption is rapid and the general reaction may be severe.

The duration of the immunity is difficult to establish, but it seems to be a matter of years rather than months. Revaccination among those constantly exposed to infection should be carried out annually. Children, 2 years old or more, bear the vaccination better than adults, and should be revaccinated at two to three year intervals, the best time being just before going to the country for summer vacation. Travelers are more exposed than natives, even in the same locality.

The chief contraindication is in the case of those suffering from chronic disease of the kidneys. No one suffering from acute illness should be vaccinated until the temperature has returned to normal. However, in the presence of an epidemic, tuberculosis of the lungs, either latent or active, is not a contraindication.

Cholera Vaccine. Oscar Teague[4] describes the standard cholera vaccine at the present time as consisting of a culture of *Spirillum cholerae* grown on nutrient agar, suspended in physiologic sodium chloride solution, and killed by heating one hour at 53 C. The vaccine made at the government laboratory in Bombay contains 8,000 million organisms per cubic centimeter; 0.5 c.c. is administered subcutaneously at the first dose, and 1 c.c. at the second dose. The local and general reactions are mild. The contraindications to its use are those that have been described for the typhoid vaccine.

The administration of two (or three) suitable doses of cholera vaccine offers a marked degree of protection against cholera during the three months following vaccination, and perhaps some protection for six months or longer. This protection is not absolute; some of the vaccinated contract cholera. Cholera carriers have been inoculated without untoward effect; but the duration of the carrier state is apparently not shortened thereby. On account of the acute onset and rapid course of the disease, one would not expect any benefit from the treatment of cholera with cholera vaccine.

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(4) Jour. Amer. Med. Ass'n., Jan. 22, 1921.

Vaccination Against Plague. Oscar Teague[5] states that there appears to be no doubt that antiplague inoculation is an important factor in diminishing the morbidity rate and the death rate during an epidemic of bubonic plague. Regarding pneumonic plague, on the other hand, it has not been shown that prophylactic inoculations cause a decrease in either the incidence or the mortality.

Acne Vaccine. Martin F. Engman[6] obtained very satisfactory results from acne bacillus suspensions (vaccines) in the types of acne vulgaris known as acne indurata, and certain forms of cystic acne in which the lesions lie deeper in the cutis. These vaccines have less effect on the more superficial types known as acne simplex and acne pustulosa, owing probably to the protection offered to the organisms by the walls of the follicles, as in these types they lie more superficially and are less accessible to immune bodies. Stock vaccines properly checked and controlled, have been just as efficient as autogenous vaccines.

"The initial dose should be from 3 to 5 million, to be repeated in from five to seven days. The interval should be gauged according to the reaction to the dose, which is usually exhibited by the appearance of a few new lesions within forty-eight hours after the injection. On the third day after the injection, comedones may be expressed and the lesions opened if necessary. The manipulations of the lesions at this time helps bring the immunizing blood to the part and it is at the height of the 'tidal wave of immunity.' Local hyperemia in the form of hot towels or that resultant from manipulation should be used on the third day after each injection and not before then."

"If, after a few such doses, new lesions continue to appear after the third day, a larger dose of from 7 to 10 million should be given and continued until a proper therapeutic result is obtained, when the interval of administration should be lengthened to two weeks, then three weeks, and finally four weeks, thus continuing the remedy in a prophylactic manner."

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(5) Jour. Amer. Med. Ass'n., Jan. 22, 1921.
(6) Ibid., Jan. 15, 1921.

"If there is an outcrop of many new lesions within forty-eight hours after injection, the dose should be lessened and the interval of dosage extended. However, if many new lesions appear after the third day, it is an indication for a much larger dose. In no instance should more than 15 million be administered in any injection.

"Staphylococcus vaccine is of little if any value in acne vulgaris. The same thing may also be said of the staphylococcus part of mixed acne bacillus and staphylococcus vaccines. Acne varioliformis, which occurs later in life than acne vulgaris and is of staphylococcus genesis, is markedly influenced by vaccines of *Staphylococcus albus* when given in suspensions of from 50,000 to 100,000 every five to seven days."

Pertussis Vaccine. Wilburt C. Davison[7] is of the opinion that pertussis vaccine has practically no therapeutic value, but that injections of Bordet-Gengou bacillus vaccines may have a slight though unreliable prophylactic effect. For prophylaxis, three injections are given at intervals of one week. For children, 500, 1,000 and 2,000 million bacilli. For adults, 1,000, 2,000 and 3,000 million bacilli.

Influenza Vaccine. Frederick P. Gay[8] reports that the vaccine composed of influenza bacilli alone has been found by carefully controlled experiments to have not the slightest preventive action. With the use of mixed vaccines a whole series of careful observers have apparently demonstrated a distinctly diminished incidence of influenza, though McCoy finds no beneficial effects from the use of mixed vaccine either. There is a steadily growing body of information, that would seem to indicate that a mixed vaccine containing streptococcus and pneumococcus in addition to influenza bacilli, used during the course of the disease, will decrease the pneumonic complications of influenza. The intravenous use of a mixed vaccine has apparently favored a rapid cure of pneumonia probably by a nonspecific protein reaction, for a typhoid protein in place of the mixed influenza vaccine has been used with equally good effect.

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(7) Jour. Amer. Med. Ass'n., Jan. 22, 1921.
(8) Ibid.

Prophylactic Inoculation Against Influenza. On the strength of his experience in the South Sea Islands, E. T. Grey[9] is impressed with the efficiency of the following plan of protective inoculation. A full dose of vaccine containing 125 millions *Micrococcus catarrhalis*, 50 millions each pneumococci and streptococci, and of a Gram-positive diplococcus, is given every five or six weeks; for the immunity begins to "peter out" after the fifth week. In view of the risk of a negative phase, he considers it clearly unwise to use it in any community where the epidemic is already well under way.

[This seems a rational suggestion for immunizing treatment, and explains the failures in past attempts. Experience has shown that recurrences of influenza, two to three months after a previous attack, are quite common. Hence the author's estimate of the brief duration of immunity and the necessity for frequent revaccination is correct.—Ed.]

Immunization Against Hay Fever. W. Walter[10] finds that there is an important difference in the therapeutic results obtained from prophylactic inoculation of pollen extracts between spring and fall hay fever. The early mild pollinoses, namely, those from rose, timothy, daisy and similar plants—the so-called rose colds—are helped by inoculations of the respective proteins. With ragweed, preliminary inoculation as a rule merely delays the onset of the symptoms by about five days. The reason for this is probably to be found in the fact that the pollen of ragweed is a microscopic bur—a bur with more penetrating qualities than other pollens. It is capable of breaking the surface of the thin mucosa. Mass contact is also more likely, and ragweed protein is more toxic than that of other pollens, when split up by the sensitized subject. In addition, we may have to deal with the secondary infections following the injury to the mucosa from these more penetrating burs and the greater irritation.

It is to be feared, therefore, that preliminary inoculation can not be carried far enough with ragweed protein to evolve enough anti-anaphylactic bodies to protect

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(9) Lancet, Sept. 13, 1919.
(10) Jour. Amer. Med. Ass'n., Sept. 4, 1920.

the patient against a dose of the protein plus the massive pollen intoxication at this season. The author reports a case in which the dose last given, that had proved harmless, produced alarming anaphylaxis when added to the local pollen absorption. With this experience, Walter gives no more large doses at the season, and is withholding all pre-season inoculation with ragweed pollen protein. He attempts to meet the anaphylatoxic poisoning by increasing blood alkalinity and by the frequent administration of minute doses of homologous protein. He has adopted an alkaline dietary and regimen. His results have so far been universally encouraging.

[The editor's experience corroborates that of the author. But why abandon preliminary inoculation with ragweed pollen extract? Even the delay of five days in the onset of the symptoms is appreciated by many. The important lesson to be learned is to avoid the use of large doses during the ragweed season—for fear of anaphylaxis—and to continue with minute desensitizing doses at that time.—Ed.]

NON-SPECIFIC PROTEOTHERAPY

Proteotherapy. Under this heading it might be permissible to discuss the parenteral use of heterogenous protein or proteose for the purpose of immunization. The topic might possibly be subdivided into proteosotherapy and protein-therapy, according to whether one gives a proteose or a foreign protein. However, there may be no fundamental difference between the two, as the protein is probably converted into other substance —possibly proteose—before it becomes active.

There is a general consensus of opinion among those who use this method that it is necessary to obtain a "reaction" in order to derive benefit from the method; and that, while the reaction is the same no matter what sort of antigen has been injected—whether blood corpuscles, milk, microbes, or peptone—there occurs a coincident increase in specific immunity in consequence. We might think of this treatment as a stimulus to the tissues having to do with immunization. By the poison artificially introduced into the body, these tissues are aroused to greater activity, some of which they incidentally expend against the poison that is producing the disease under treatment. The problem of the method consists in so administering the treatment as to avoid violent "shock," while yet obtaining an "efficient reaction." The method is by no means incompatible with other measures—specific or otherwise—that have been found of advantage in the disease under treatment. Indeed specific vaccine may be given at the same time or later.

Vaccinotherapy does not differ fundamentally from proteotherapy. The vaccine is an antigen like the protein or proteose. It differs from proteotherapy by its much greater accuracy. As will be seen, proteotherapy is chiefly of use in conditions in which efficient vaccinotherapy has not yet been elaborated.

The indications for proteotherapy may be summarized as follows:

First, in infectious diseases, in which the causative organism is unknown or not certainly determined, such as rheumatic fever and rheumatoid arthritis.

Second, infective diseases in which the causative organism is known, but in which specific vaccine therapy is of little value; for example, pneumonia, gonorrheal arthritis.

Third, chronic disorders of doubtful or unknown etiology, such as psoriasis, phemphigus, lupus erythematosus and bronchial asthma.

The Non-Specific Reaction. This is discussed in general by W. F. Petersen.[1] He speaks of it as a diphasic reaction. The first phase (negative) is associated clinically with an intensification of the disease manifestations, the second phase (positive) with clinical improvement, with reconstruction, with general euphoria. It seems probable from clinical observation, that the second, or positive, phase is in a measure a function of the negative in that within certain limits the greater the irritation, the greater the tendency to complete restitution to the normal when the balance once swings in that direction. And it is equally apparent that in dealing with such a reaction the physician must keep in mind

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(1) Jour. Amer. Med. Ass'n., Jan. 29, 1921.

that he may at times do decided harm instead of good. If a patient is given too large a dose (particularly of such a toxic substance as typhoid vaccine or colon vaccine), or injected when no longer capable of reacting to stimulation, or if a latent inflammatory focus is activated, the fault will lie in the judgment of the physician and not with the fundamental principle that underlies the method.

Regarding the mechanism of action, Petersen favors two of the several theories that have been suggested. The therapeutic effect may be due to stimulation of the organism, the resulting reaction representing summation of all the forces of resistance with which it is equipped. The leukocytes become more active, their number is increased by the stimulation of production in the bone marrow, antibodies heretofore fixed to the cell are shed, enzymes are mobilized, glands of internal secretion are stimulated. Naturally, such a conception involves the recognition that when once the organism is fatigued beyond the point of reaction no amount of injections or non-specific therapy will avail. This coincides with the general clinical experience that non-specific therapy, if it is to be used successfully, must be used early in the disease. Apart from this active phase of increased resistance there is to be observed a second method of defense that finds its expression in an increased tolerance to intoxication. This condition is closely associated with the state that has been observed after anaphylactic shock—anti-anaphylaxis, or desensitization, as one may wish to term it.

Certain studies have justified the conclusion that the various agents injected are all followed by marked changes in the permeability of the cell membranes, and that it is this fundamental change that is probably at the basis of the therapeutic effect observed in non-specific therapy. At first the cell membrane seems more permeable. This corresponds with the fact that there is an increase in the lymph flow, the irritability of the nerve cell is increased, and there is a freer exchange between blood plasma and cell content, that is, sensitized cells give up their antibodies, enzymes are mobilized, thrombokinase and fibrinogen increases, and the sugar level is altered. This period of increased cellular permeability corresponds with the clinical period of increased general malaise and the increase of the inflammatory reaction at local foci. This phase is followed by one of diminished permeability. It is in this stage that we find the cellular resistance to intoxication increased, the threshold for nerve stimuli raised and evidences of intoxication and inflammation subsiding while the patient experiences euphoria.

In conclusion Petersen reminds us that non-specific therapy is still to some extent in an experimental stage and that we are not yet fully competent to judge the ultimate range of its usefulness.

Foreign Protein Therapy in the Acute Infections. Joseph L. Miller[2] concludes that the permanent value of this method of treatment is still to be determined. The immediate disappearance of all evidence of infection in a certain rather small percentage of cases following protein therapy is established, and this should serve as a stimulus to future well controlled investigation.

The results in the treatment of typhoid are quite uniform, regardless of what particular form of foreign protein is used. About 20 per cent. terminate by crisis following one or, at most, two or three injections. Rapid lysis occurs on an average in an additional 20 per cent. A change in the form of the fever curve with probable slight shortening of the course of the disease occurs in, roughly 20 per cent. The course of the disease is apparently not noticeably modified in the remaining 40 per cent.

In the treatment of typhus fever this method of treatment seems to lower mortality. Miller tried this method of treatment in several cases of septic endocarditis, but without either permanent or temporary relief. When typhoid vaccine is used in cases of pneumonia there is, in a limited number of cases, termination by crisis or rapid lysis following a single treatment. More frequently, however, the patient is only temporarily detoxicated, the disappearance of pleural pain and decreased temperature with return of the pulse and respi-

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(2) Jour. Amer. Med. Ass'n., Jan. 29, 1921.

ration to normal continuing for only a few hours, when the previous symptoms again recur. This method of treatment has been used in pulmonary and bone tuberculosis in man. None of the reports consulted, however, present convincing evidence. With other well recognized methods of treatment available there is no place for foreign proteins in the treatment of syphilis. The reports on iritis and trachoma warrant further application of this method of treatment. The treatment of anthrax in man with normal beef serum given either subcutaneously or intravenously in doses of from 30 to 50 c.c. has been reported to give better results than have been obtained from the use of immune serum.

In Germany a series of cases of diphtheria treated with normal serum is claimed to have given results as satisfactory as controls receiving antitoxic serum. Clinical reports fail to support this claim, although suggesting some benefit derived from the normal serums. Hence, no physician would care to assume the responsibility of administering a foreign protein in diphtheria in lieu of antitoxic serum.

Experience has shown that, when the dosage is carefully determined, *i. e.* just a sufficient amount to excite a chill, this method is practically free from danger. The only untoward results observed have been the development of delirium tremens in confirmed alcoholics. However, the treatment was not administered to enfeebled individuals or those with disturbed heart action.

Non-Specific Protein Therapy in Arthritis. David Murray Cowie[3] states that while it can not be questioned that very remarkable beneficial effects have followed the intravenous injection of foreign proteins in the arthritides, there will be found a large percentage in which no permanent beneficial effect can be secured by this method of treatment. Hence, we must approach any given case with definite conservatism. As unquestioned relief from pain will often follow protein therapy, even though the focus of infection is not removed; and, in some cases, in addition to improvement in the joint condition, the focus itself may cease to be active, a trial of this treatment is justifiable. Acute or sub-

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(3) Jour. Amer. Med. Ass'n., Jan. 29, 1921.

acute processes that have not progressed beyond the first year are the ones that give the best results, particularly those that have not gone on to marked structural change of the articular or peri-articular tissue; next to these, cases which have progressed longer and which may show structural change, but which have not produced definite ankylosis and its consequential results.

At present bacterial protein seems the protein of choice, and typhoid vaccine is most generally used. There is a general impression that the maximum benefit will be derived from a dose just sufficient to give rise to a chill. It is good practice to let a day intervene between the injections. If any benefit is to be secured from this method of treatment, from 1 to 10 injections will suffice. Uncompensated cardiac lesions, acute endocarditis or pericarditis should be considered as contraindications.

Proteosotherapy. P. Nolf,[4] who was probably the first to use proteosotherapy (1908), in non-infectious diseases, employed it during the war, also in the treatment of infection. To avoid shock, at least violent shock, the injection of even a very small dose must proceed extremely slowly. The injection may take many minutes, and during the entire period of the injection it is necessary to watch the pulse carefully, in order to permit the operator to interrupt or slow down the injection in case the pulse becomes too fast, for this indicates a rapid fall of blood-pressure. Thus, when giving peptone in 10 per cent. solution, a very fine needle is used and a nurse keeps the pulse-frequency under constant observation, calling out the number of beats in each quarter of a minute. If this exceeds 35 a quarter the injection is temporarily stopped. The usual dose is from 5 to 6 c.c. up to 7 to 10 c.c. of a 10 per cent. solution of peptone. If one is prudent, the procedure usually takes place without accident. One may find a little transitory tachycardia, some very deep breathing or dyspnea, and a transitory headache. All this passes off within a few minutes; but, after the lapse of from a half hour to two hours, the patient usually suffers from a more or less

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(4) Jour. Amer. Med. Ass'n., Nov. 22, 1919.

prolonged rigor, which is followed by a state of defervescence with profuse sweating. The fall of temperature may last until the next day. This is accompanied by a subjective sensation of amelioration and by a diminution in the objective signs of the infection. Nolf repeats the injections only every other day. In a great number of cases, improvement is shown after one or two injections; but it is necessary to continue these injections until a complete cure has been established, in order to avoid a recrudescence.

This treatment has been used by Nolf with good results, at first in typhoid fever, then in numerous cases of septicemia due to streptococcus and staphylococcus In a large number of cases one finds a rapid disappearance of the germs from the circulating blood. He has also obtained good results in severe erysipelas, in acute polyarticular rheumatism, and in non-rheumatismal arthritis when taken at the start. He considers it well established that the judicious intravenous administration of peptone can exercise a favorable action in certain infectious conditions and especially in the septicemias.

Intravenous Injections of Peptone in Typhus. E. P. Tagle[4] reports fifty-nine cases of typhus fever treated with Nolf's method of intravenous injections of peptone with a mortality of about 5 per cent. Nolf's technique was closely followed, except that the acidity of the solution of peptone in physiologic serum was reduced to 4.3 per thousand, and the remedy was put up in 5 c.c. ampoules. About 10 c.c. were given as the first dose, to robust adults. For older children, from 4 to 5 c.c. up to 6 or 8 c.c. were given. After an interval of forty-eight hours, only about half the original dose was given. Nearly all patients received two injections; only exceptionally a third dose of 1 or 2 c.c. was administered. The beneficial effect of proteosotherapy is better shown by the fever chart than by anything else. In every case improvement in the general condition was unmistakable, and the duration of the disease shortened.

Proteosotherapy in Asthma. As a result of his experience, with this treatment, A. G. Auld[5] divides cases

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(4) Rev. médica de Chile, August, 1919.
(5) Brit. Med. Jour., April 24, 1920.

of asthma into two main groups: One that responds quickly to the treatment, the other that resists it; though, among this latter group, there are cases in which by careful immunization the disease may be largely overcome.

The first group presents as a rule the following characteristics: general good health, little family predisposition, limited duration of the disease, regularity in recurrence of attacks, freedom from bronchitis and emphysema. None respond better to this treatment than children. Auld found none of the children he treated to be refractory.

The group that resists the treatment includes those patients with chronic bronchitis and developed emphysema, and individuals presenting cyanosis or more or less constant dyspnea. As a rule the affection has lasted many years, and there is a family history of asthma. Even in this group some amelioration and occasionally very satisfactory results may be obtained.

The author admits that there are cases, but they form a small class, in which idiosyncrasy against certain foods, or animal or vegetable emanations exists. Again, the dyspneic attacks in bronchitis may be due to the products of bacteria locally. But in the great majority of general asthmatics the explanation is to be sought in a defect in the hydrolysis of the foreign protein. To this protein poison the asthmatic individual is sensitive; and the bronchial muscles contain the dominant receptors for it. Proteose confers on the body fluids a resistance to the induced poison, when used either in small immunizing doses, or in one dose large enough to produce a definite reaction.

The technique of this treatment was given by Auld in a previous communication:[6] He uses a 2 per cent. solution of Witte's peptone, or Armour's. (A peptone may be roughly tested by adding an equal volume of saturated aqueous solution of ammonium sulphate to a 10 per cent. solution and stirring with a glass rod. If the peptone is satisfactory, a sticky precipitate comes down in abundance and adheres to the stirrnig rod.) To the peptone solution, dissolved as far as possible in normal

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(6) Brit. Med. Jour., July 20, 1918.

saline (made up to ¾ volume), by slight agitation and warming at 37° C., is added 1 c.c. of a 2 per cent. sodium carbonate solution for each 0.30 gm. of peptone, to insure the right degree of fineness in the suspension. This is then made up to volume with normal saline, using 0.025 per cent. phenol as a preservative. Auld generally gives an initial dose of 0.3 c.c. (5 minims), and increases by 0.2 c.c. (3 minims) every fifth day for six injections, with three or four more later, employing in each the same dosage as that of the sixth injection. A slight reduction in dose with children, with none given during attacks are modifications that might be necessary. To administer, cleanse the bend of the patient's elbow, and make gentle pressure on the upper arm, the thumb passing across the biceps. Insert the needle into the vein and as soon as blood ensues freely from it withdraw the pressure and hold the needle immobile; affix the syringe and give injection. No after-dressing is necessary.

[That the intravenous administration of peptone is not devoid of danger should be borne in mind. cf. ''Danger of Intravenous Administration of Colloids.''—Ed.]

Milk Injections. M. Schulman[7] has obtained gratifying results from intramuscular injection of milk, in about five dozen cases of arthritis. His cases represented all sorts of infectious arthritis, including acute polyarticular rheumatism. The most brilliant results were obtained in gonorrheal cases. Inasmuch as the intramuscular injection of milk gives as good therapeutic results as do the intravenous injections of various proteins, the author feels satisfied that the method should be preferred for its simplicity, safety, and the ready availability of the agent.

The method consists in injecting *intramuscularly* (not intravenously), with all the precautions as to asepsis and avoidance of entry into a vein that are commonly employed, of cow's milk that has been sterilized by boiling for about five minutes, and subsequently cooled to a comfortable temperature. The initial dose for an average-sized adult is 4 c.c. The injection is generally repeated every other day, and the dose is increased by 1 c.c. at every injection. The total number of in-

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(7) Med. Record, July 10, 1920.

jections required varies with the individual case, and may be anywhere from two to ten. The author has never given more than ten injections to a patient, for he always had reason to think at the end of such period that he had obtained all the good possible; the patient was either well, or had ceased to show progressive improvement. The increase in dosage also is not a fixed and constant matter, but will depend on the degree of improvement and more especially on the severity of the constitutional reaction. When the patient has a severe reaction, the dose injected following such reaction should not be increased at all over the previous one; it rarely has to be reduced. To get any good out of the treatment, a constitutional reaction must be produced. If none results after two or three injections, the method must be changed. Intravenous protein injection may then produce a reaction and a cure, where the intramuscular method had failed. For intravenous use some bacterial protein seems best, especially since this has been most used and something of the proper dosage is known. If it is not convenient to carry out the treatment at home, it may generally be quite safely given at the office or clinic. The patient should then be directed to go immediately home, go to bed, and stay in bed the rest of the day. The reaction following an intramuscular milk injection rarely comes on in less than one and one-half hours, and this gives the patient, in most instances, ample time to get home before its onset. The febrile reaction rarely lasts more than eight hours; but in the exceptional cases in which it lasts longer the patient should be directed to remain in bed so long as there is any fever or other constitutional discomfort. Local disturbance at the site of injection is never severe enough to incapacitate the patient. Several patients showed, after the second or later injection, a local allergic reaction; but this was never severe enough to cause much inconvenience. The time interval between injections should be as stated, unless there is some good reason for lengthening it, as when the reaction is unduly prolonged. An injection should not be repeated before the symptoms from the preceding one have entirely disappeared.

For fear of anaphylaxis, the second injection should never be given, unless it can be administered after an interval of less than ten days. In view of the possibility that a person may be rendered sensitive to foreign protein for a lifetime, it would be much safer, in the event that a course of parenteral protein treatment had been interrupted for some time and it was desired to resume it, to use a protein from a different species.

Milk Injections in Pneumonia. S. Corinaldesi[8] reports success from the intramuscular injections of 5 or 10 c.c. of sterilized milk in five patients with lobar or bronchopneumonia as well as in typhoid fever. Improvement followed one, two or three injections, without local reaction. There was only rarely a slight chill.

Milk Injections in Gynecologic Conditions. M. Trossarello[9] reports great benefit from injections of milk in twenty cases of gonococcus ovarian and tubal disease. His results surpassed those obtained with specific vaccines or antiserums. He injected into the buttocks 5 or 10 c.c. of milk, at intervals of three or four days, to a total of five injections. The best results were noted in patients who had the strongest reaction. As the chill follows the injection after two or three hours, ambulatory treatment is possible. Patients are usually able to reach home before the reaction occurs. In fifteen cases of venereal bubo, the results were sufficiently encouraging to justify its tentative application in the abortion of the lesion. No benefit was obtained in cases of urethritis, prostatitis, epididymitis, and arthritis.

Colon Bacillus Proteotherapy. A. E. Gow,[1] using *B. coli* vaccine, finds that, within fairly wide limits, the size of the dose has but little effect on the severity of the reaction. A higher temperature was obtained in one patient after an initial dose of 50 million killed *B. coli* vaccine than after 20 million of the same vaccine in another. The initial dose for an average adult may with perfect safety lie between 50 and 100 million. As, in order to obtain the desired effect it is necessary

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(8) Rif. Medica, March 20, 1920.
(9) Ibid., April 3, 1920.
(1) Brit. Med. Jour., Feb. 28, 1920.

to produce moderate reaction the dosage in successive injections must be progressively slightly increased.

Technique: The patient having taken a mild aperient the evening before, and a light breakfast in the morning, should receive the injection before mid-day, so that the transitory unpleasantness of the reaction may be over before night. The patient is confined to bed for twenty-four hours at least.

The requisites are: "(1) Ether and cotton to clean the skin; (2) a sterilized needle and syringe of 10 c.c. capacity; (3) the vaccine containing, say, 100 million coli or typhoid bacilli per cubic centimeter; (4) 10 c.c. of sterile warm normal saline solution; this is for diluting the vaccine, as it is more convenient if the volume of the injection measures 10 c.c. rather than 0.5 or 1 c.c., as the larger quantity is easier to handle, and the dose of protein can be given more slowly; (5) adrenalin solution 1 in 1,000, or 1/100 gr. tabloids of atropine sulphate; (6) an assistant to help in filling the syringe and to constrict the patient's arm, and thus render prominent the veins in the antecubital fossa, is also desirable. Dr. R. G. Canti has designed a very simple tourniquet, easy to release, which is admirably suited for the latter purpose."

Method: "The skin over the selected vein is cleansed, and the desired dose of vaccine, whether 0.25, 0.5, or 1 c.c. is drawn into the syringe, and the volume made up to 10 c.c. with normal saline. The assistant now applies the tourniquet, or constricts the upper arm, which is lying flat on the bed fully extended, and the patient is told to open and clench the fist several times until the vein on the front of the elbow becomes prominent; in some individuals the veins are more easily felt than seen. The needle of the syringe is inserted into the vein in the usual manner of vein puncture; a successful puncture is indicated by a flow of blood into the syringe. The assistant now relaxes the tourniquet (or his hold on the arm), and the injection is made very slowly; that the fluid is entering the vein and not the perivascular tissues is shown by complete absence of swelling in the region of the needle point. When the contents of the syringe have been pushed into the vein the needle is withdrawn and the arm held vertically upward for a few minutes to prevent extravasation of blood; no dressing is required.''

The reaction does not follow for from three-quarters of an hour to five hours after which, somewhat suddenly, the patient is taken with twitchings of the muscles of the legs. The twitchings may become general; and are followed by a rigor, the chilliness lasting perhaps intermittently for from fifteen to forty-five minutes. During this time, the patient has headache, usually frontal, and commonly abdominal discomfort with nausea and not infrequently vomiting. In a reaction of unusual severity, the patient may be restless, with dyspnea and cyanosis. Such symptoms are speedily relieved by a hypodermic injection of 0.75 c.c. of 1-1,000 epinephrine, or 0.0006 gm. atropine sulphate. Prior to the onset of the shivering, the temperature begins to rise and continues to do so until about the sixth hour. It commonly reaches 103° F. and 104° F. before returning to normal at the end of twenty-four hours. With succeeding injections of increased dosage the fever, though reaching an equal height, is apt to be of shorter duration, and the whole reaction is more quickly completed. The pulse frequency is increased during the reaction, and extra-systoles may occur during the rigor. The blood-pressure has a tendency to fall, though the diastolic pressure generally rises appreciably during the first hour, the rise continuing until the end of the rigor. The blood-pressure is normal again after twenty-four hours.

Very interesting changes occur in the blood. There is an almost immediate fall in the number of white blood cells, especially in the number of polymorphonuclears, so that by the end of the first hour they will be outnumbered by the lymphocytes. A rapid increase follows the rigor, and the maximum of 20,000 to 30,000 per cubic millimeter is reached in twenty-four hours. This is followed by a fall to the pre-injection figure in approximately seventy-two hours. The phenomenon has been compared to the manner in which the London populace fled from the streets for cover in the tubes on the warning of an air raid, and how when ''all clear'' was sounded, these persons emerged from their retreat accompanied by others to mark the result of the invasion.

Non-specific Vaccine Therapy of Infantile Furunculosis. H. Langer[2] calls attention to the fact that owing to the low resistance offered by infants to infection—as evidenced by the multiple dissemination of furuncles in the infant as contrasted with solitary formation in the adult, as well as by the absence of protective body formation shown in experiments undertaken by the author—non-specific rather than specific vaccine therapy is indicated. The aim of non-specific vaccine therapy, or proteotherapy, is to stimulate cells to the production of antibodies and thus to mobilize a defensive reaction to the highest possible degree. Hence, it is of no importance whether we use stock or autogenous vaccines in the infant. The dosage can be larger, in view of the insensitiveness of the patient. The author uses from 500 to 1,000 million bacteria preferably given intramuscularly. The injections are given daily, as in contrast with specific therapy a negative phase is not to be feared. Usually two or three injections suffice to make a marked and satisfactory impression upon the case. The author did not have occasion to repeat the injection more than four times; though, in view of the absolute harmlessness of the treatment and the absence of any reaction whatever, a greater number of injections or other modifications of the treatment might be undertaken.

Horse Serum in Cachectic Tuberculous Children. A. Czerny, and H. Eliasberg[3] used horse serum in daily subcutaneous injection of from 0.5 to 2 c.c., to a total of 47 or 50 injections, in some cases with almost marvelous results.

Spinal Fluid as Remedy. Siegfried Block[4] reports remarkable improvement in 100 per cent. of cases of violent chorea from the following method: He withdraws spinal fluid, about 20 or 30 c.c., or more if there is much pressure. This fluid is permitted to flow into a sterile test tube with a sterile cotton stopper and placed on ice. In severe cases twice daily, an ordinary 2 c.c. hypodermic syringeful of this fluid is injected subcutaneously. The original test-tube of spinal fluid may be kept on ice and used as required. The author emphasizes the

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(2) Therap. Halbmonatsh., March 1, 1920.
(3) Monatschr. f. Kinderhlk., April, 1920.
(4) New York Med. Jour., May 29, 1920.

fact that no cure was obtained in any case from this treatment. However, he cites, in detail, four cases in which prompt and great amelioration of symptoms was obtained in this manner.

That the results are not due to the lowering of cerebrospinal pressure is shown by the fact that in about sixty cases, in which spinal fluid was withdrawn and not injected subcutaneously, there was no improvement.

ALLEGED RESTORATIVES

Phosphorus Compounds as Therapeutic Agents. J. W. Crane[5] points out that it is now known that tuberculosis is not due to a deficiency of phosphorus, and that, even if it were, there is no justification for giving hypophosphites for the sake of the phosphorus content, because very little, if any, of the hypophosphite is metabolized; it is excreted unchanged. Phosphorus medication either as hypophosphites, phosphates, glycerophosphates or phospho-lecithin has no definite value in the treatment of pathologic conditions, nor do they have any value as foods. Many physicians still use the hypophosphites partly from force of habit, partly because of the psychologic effect of the propaganda carried on by the manufacturers who laud their wares most extravagantly. If there is ever a definite indication for the use of phosphorus, one and a half pints of milk or three eggs daily will supply more phosphorus than the patient can metabolize. If the profession is to learn more about the action of drugs, it is essential that the patient be given one drug (instead of a mixture of from three to ten). Accurate observations should be made and recorded and finally an analysis of the results obtained.

FUNCTIONAL THERAPY

LOCAL ANESTHETICS

Benzyl Alcohol as Local Anesthetic. David I. Macht[6] found that solutions of from 1 to 4 per cent. furnish a satisfactory local anesthetic when infiltrated in the tis-

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(5) Can. Med. Ass'n Jour., May, 1920.
(6) Jour. Amer. Med. Ass'n, Oct. 30, 1920.

sues, either alone or, still better, combined with small doses of epinephrine. A much better anesthesia of mucous or skin surfaces can be produced by application of pure benzyl alcohol, which, however, can not be injected into living tissue for the same reason that pure ethyl alcohol can not be administered in that way; it leads to local necrosis. When benzyl alcohol is mixed with chloroform the local anesthesia after its application extends more deeply below the surface.

Benzyl alcohol either alone (100 per cent.), or, still better, mixed with an equal part by volume of chloroform, furnishes a most efficient anodyne for toothache, when introduced on a pledget of cotton into a tooth cavity, or applied to an exposed nerve. The relief obtained by the use of such drops is marked and almost instantaneous, and is also long-lasting. Macht is not aware of any other drug, with the exception of cocaine, which is more efficient in relieving toothache. As benzyl alcohol is the least toxic of all the well-known local anesthetics, the repeated use of such a combination as was described above, is free from the objections which may be raised against the employment of cocaine. It can be administered with impunity, he states, even to small children.

Comparative Efficiency of Difficulty Soluble Anesthetics on Mucous Membranes. By experiments on the cornea of rabbits T. Sollmann[7] found that anesthesin, cycloform, orthoform-new and propaesin appear to be practically equivalent, and that they are certainly effective in concentrations of 10 per cent., with which concentration the anesthesia persists for from ten to fifteen minutes. On the gums, the minimum concentrations giving almost complete anesthesia were as follows:

	Per cent.
Cycloform, less than	2.5
Anesthesin	2.5 to 5.0
Propaesin	5.0 to 10.0
Orthoform-new	10.0 to 25.0

Local Anesthesia in Nose and Throat Work. We abstract the following data from the report of the com-

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(7) Jour. Pharm. and Exper. Therap., August, 1919.

mittee on Local Anesthetics of the Section on Laryngology, Otology and Rhinology:[1] Local anesthesia is the ideal method for affections of the nose and throat. However, each operation should be proceeded by a hypodermic injection of morphine and atropine, and the patient kept in the hospital. In nose operations, epinephrine should be applied first, followed by cocaine, and the injection of the synthetic drug introduced slowly. In throat operations, a 5 or 10 per cent. solution of cocaine should be applied, followed by the *slow injection* of the synthetic product. None of the synthetic products equals cocaine in its local effect when applied to the mucous membranes.

Recent literature contains the records of two deaths from cocaine, three deaths from procaine, and one death from apothesine. To these, the committee adds twenty fatalities, fourteen that occurred as a result of the administration of cocaine, and six from procaine. The fatalities either occur immediately or not at all. The greatest danger lies in too rapid injection or in entering a vein. A fourth of the deaths arose from mistakes in strength of solution. When there is a suspicion of possible danger, as in patients with evident cardiac disease, exophthalmic goiter, or other disturbances of internal secretion, one-fourth the amount of anesthetic to be used at the time of operation should be applied and the patient watched for toxic effects.

Occasionally epinephrine loses its ischemic effect on boiling. Procaine is difficult to sterilze. It is suggested that sterile tablets be placed in a sealed vial or ampoules, sterile water to be added before injection. The suggestion is also made that these tablets be colored with a distinctive dye to call attention to the drug and its concentration. The only local anesthetic that produces edema and sloughing is quinine and urea hydrochloride; hence, so far as nose and throat operations are concerned, this drug has practically gone into "innocuous desuetude."

Duration of Cocaine Action. C. A. Mills[2] found by experiments on rabbits that no cumulative effects occur from repeated injections of cocaine unless the interval

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(1) Jour. Amer. Med. Ass'n., July 31, 1920.
(2) Jour. Pharm. and Exp. Therap., December, 1919.

between injections is less than one and one-quarter hours. This indicates rapid destruction and elimination of the drug. The iris, on the other hand, is found to be sensitized (to epinephrine) by cocaine for as high as twenty-five hours, due either to slow elimination of the cocaine from the tissues affected, or to more persistent functional changes following the disappearance of the drug.

Apothesine in Hyperemesis. In nearly every instance, in which L. Levy[3] used this drug, doses of from 0.08 to 0.16 gm. have been successful in relieving the nausea of pregnancy.

He also applied the same method in four cases of postoperative vomiting and reports similarly successful results. In a case of acute dilatation of the stomach, the vomiting was controlled by administration of apothesine.

The Limitations of Apothesine. According to a report of the Council on Pharmacy and Chemistry,[4] apothesine belongs to the procaine rather than the cocaine type, that is, it belongs to that type, which while effective for injection anesthesia (especially when combined with epinephrine) is relatively inefficient when applied to mucous membranes. It is, in fact, far inferior in this respect to cocaine and to some other local anesthetics. Apothesine may be used for spinal anesthesia. Its absolute toxicity is less than that of cocaine (as 20 to 15) but about twice that of procaine. With intracutaneous injections the efficiency of apothesine is unmistakably lower than that of cocaine, being at best one half, and it is never greater than procaine and averages considerably below it. Hence, apothesine is distinctly inferior to cocaine and still more so to procaine.

Death from Apothesine Spinal Anesthesia. W. S. Duboff[5] reports a death from the use of a 0.10 gm. tablet dissolved in 3 c.c. of distilled water and injected intraspinally. At the end of the second minute there was anesthesia to the iliac crests. "At the end of three

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(3) Therap. Gaz., January, 1920.
(4) Jour. Amer. Med. Ass'n., Jan. 24, 1920.
(5) Ibid., Aug. 28, 1920.

minutes the surgeon was told he could proceed. But before the patient could be draped, he suddenly became ashy, complained of a tightness in the chest, an inability to draw his breath, and announced that he was dying. The pulse could not be felt at this time. The respiration became very labored and ceased a few seconds later."

A rapidly ascending paralysis, with cardiac failure preceding respiratory failure is to be found in reported deaths from spinal anesthesia regardless of the drug used.

Local Anesthetic Action of Saligenin. As a result of a study of a series of phenyl carbonols, A. D. Hirschfelder, A. Lundholm, and H. Norrgaard[1] arrive at the conclusion that saligenin is the best of the series for selective action on sensory nerve fibers, non-irritating qualities, and for low general toxicity for frogs and mammals. It is superior to benzyl alcohol, the anesthesia of which is often uncertain, and frequently followed by subcutaneous edema and pain at the site of injection.

Saligenin in 2 per cent. solution has been used in a number of minor operations and found as satisfactory as procaine, to which it is superior by being less toxic.

Rose Oil a Local Anesthetic. Benzyl carbonol, a volatile oil with rose-like flavor present in oils of roses, of orange flowers and of pine needles, has been found by A. M. Hjort and J. T. Egan[2] to possess local anesthetic powers superior to those of benzyl alcohol. Thus 1 per cent. dilution was found as efficient an anesthetic on the rabbit's cornea as 1.25 per cent. benzyl alcohol. It is, however, not suitable for conjunctival anesthesia on account of its irritant action. A solution of 0.025 per cent. was found sufficient to produce anesthesia by the wheal method, while the minimum concentration of benzyl alcohol was found to be 0.03 per cent., and of procaine, 0.03125 per cent. The toxicity of rose oil is about the same as that of benzyl alcohol; but it is more stable than the latter. It is soluble to the extent of 2 per cent. in water, and may be sterilized in the autoclave without deterioration.

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(1) Jour. Pharm. and Exp. Therap., May, 1920.
(2) Ibid., November, 1919.

GENERAL ANESTHETICS.

Ethyl Chloride. R. W. Hornabrook[4] considers ethyl chloride one of the safest, if not the safest, of all anesthetics, and certainly the most convenient for brief operations, being far ahead of the cumbersome nitrous oxide-oxygen combination. At the Melbourne Dental Hospital, all extractions are done under ethyl chloride anesthesia, and in 34,433 cases there has not been a single fatality, even though the vast majority of anesthesias were induced by dental students, the patient being in the upright position. The anesthetic is always given by the open or semi-open method, the air valve of the inhalor being wide open at the commencement of the induction, and then gradually closed. The author is strongly opposed to the completely closed method. Except in post-nasal, tonsil cases, and dental extraction, Hornabrook gives, three-quarters of an hour before operation, 0.01 gm. morphine and 0.0005 gm. atropine to males and 0.008 gm. morphine and 0.0004 gm. atropine to females.

Ether-Oil Colonic Anesthesia. Walter Lathrop[5] has employed this method in 1,002 cases of various kinds, chiefly goiter. Within five minutes after the injection of the mixture into the rectum, it is heated to body temperature; some ether leaves the oil in the form of gas, which is absorbed by the blood in the capillaries about the colon. The odor of ether and of paraldehyd (when the latter is given in this manner), can be detected on the breath in from three to five minutes after the administration of the dose. The accumulation of mucus or saliva, seen often in inhalation anesthesia, is absent; there appears to be no irritation of the lungs. The respiration is normal, as a rule, and very seldom noisy and stertorous. The eye reflex is usually retained, even though good muscular relaxation be present. The pulse is maintained at an even plane. Postoperative effects are better, Lathrop states, than with the routine inhalation methods of ether and chloroform. There is less vomiting or nausea, and the patient is usually comfort-

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(4) Brit. Med. Jour., April 3, 1920.

(5) Jour. Amer. Med. Ass'n., July 10, 1920

able and can retain nourishment. There is considerable analgesia for some time, often for two or three hours. This method is especially useful in head and neck operations, because the operator is not troubled by either cone or anesthetist. It is also useful in hernias, especially in patients with asthma. The most valuable of all its uses is in those conditions of high nervous tension, such as hyperthyroidism, or in cases just on the border line of toxic goiter, and also when fear is a prominent factor, as seen in nervous women, and in men as well. To be able to etherize a patient in bed, remove him to the operating room, perform the operation, and return him to bed with little or no knowledge of what has been done, is surely worthy of consideration, and trial in proper cases.

Technique of Administration: The evening before operation an enema of soapsuds (1 liter) is given. A second enema of 0.5 or 1 liter of clear, tepid water is given early next morning. Supposing the operation is set for 11 a. m.; then at 9:30, 8 c.c. of olive oil (warm), 12 c.c. of paraldehyd and 16 c.c. of ether, are given. The patient should be kept as quiet as possible. At 9:50, 0.015 gm. of morphine and 0.0004 gm. of atropine are given hypodermically. At 10:20, from 90 to 120 c.c. of ether and 60 c.c. of olive oil (warm) are given. The oil and the ether are put in a bottle and shaken thoroughly. The mouth and nose should be covered with several thicknesses of gauze. The injection should be given slowly, by the high technique, *about one ounce a minute,* the funnel being held about three inches above the level of the patient. The tube should be clamped and allowed to remain in the rectum so that the mixture may be withdrawn during operation if there should be any indication for doing so. If there is any excitement, 15 or 20 drops of chloroform usually quiet the patient. If the patient can not retain the oil-ether mixture, one should not try to repeat, but abandon it. The patient should be ready for operation in from twenty to thirty minutes from the time the last injection is given. In alcoholic subjects, 0.0006 gm. of scopolamine (hyoscine) is added to the preliminary hypodermic injection of morphine. When the operation is completed, the bowel should be well irrigated with tepid water until it returns clear. One pint of water is then put in the bowel and left, or olive oil may be given in quantity of 120 c.c. to prevent any possible irritation.

Alkaloids in Anesthesia. G. A. H. Barton[7] is in favor of employing alkaloids as a preliminary to the administration of anesthetics, providing one clearly appreciates the object of administration, the indications and contraindications, and the limitations of the method. The main object of giving preliminary narcotics is the patient's safety and comfort. Their administration should be followed with open ether. Many operations can then be done under an extremely light narcosis with absolute safety, the patient being calm and placid, often even drowsy and his mucous membranes dry. There is less postoperative vomiting and other discomfort. Surgical shock is hardly ever seen. Exceptions are those individuals who react badly to morphine. Of course, if such idiosyncrasy is known beforehand, morphine should be avoided.

The alkaloids used, either alone or in various combinations, are morphine, scopolamine, and atropine; most commonly a combination of morphine 0.015 and scopolamine 0.0006 gm. in 1 c.c. of water. Morphine is the principal factor in causing the drowsiness and placidity of the patient. Atropine has little or no narcotic effect, on occasions it acts as an excitant; it increases the rapidity of the heart's action and in children a flushed face is generally remarked and the eyes are bright; it has a powerful drying effect on the mucous membranes. Scopolamine has a distinctly narcotic effect, and a drying effect almost as decided as atropine.

During the anesthesia, the effect of morphine on the respiratory center must always be borne in mind. It is a depressant, reducing the frequency and depth of respiration. Ether is a respiratory stimulant and the result of the combination is to produce a good regular type of breathing. On the other hand, chloroform, except in the early stages, is a repiratory depressant; and so should never be deliberately preceded by morphine. If circumstances arise which render the administration

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(7) Practitioner, October, 1919.

of chloroform necessary subsequent to morphine, the greatest care should be observed, for the patient's breathing will become shallow and his color dusky. Barton holds that it is not only quite unnecessary, but a mistake to set out to produce the classical signs of the third degree of narcosis—surgical anesthesia as it is called. The narcosis to be aimed at is something between drugged sleep and surgical anesthesia.

Morphine, whether accompanied by atropine or not, contracts the pupil, and the degree of contraction is an index of the morphine effect on the patient; and, if it is pronounced, the patient will require very little anesthetic; if it is not present, he will probably require a good amount. The contracted morphine pupil persists throughout the anesthesia, and does not follow the usual stages. The reflexes during these mixed narcoses are sometimes very brisk. The corneal reflex is especially so; and, in fact, one should never aim at abolishing it. Morphine prolongs the recovery stage. The patient generally dozes comfortably for some hours after, much to his advantage, avoiding thereby the pains and discomforts immediately following operations.

A preliminary injection of narcotics is especially indicated in operations on the upper air passages, in all operations on children for which ether is to be given. In endotracheal, rectal, and intravenous ether administrations, and in endothecal analgesia, morphine combined with scopolamine or atropine, is an almost essential preliminary.

Contra-indications: Morphine should not be given to the young, certainly not under the "teens." After that, in suitable doses, it may be given at any age, except in cases of Bright's disease, and in all cases in which the blood is insufficiently oxygenated, whether arising from heart or lung disease, from pressure on the diaphragm from below by fluid, tumors in the abdomen or from large pleural effusions. There are two classes of operations in which the advisability of its administration is open to question, *viz.,* laparotomies and certain operations on the nose and throat. It is more difficult to maintain as good relaxation with morphine and open ether than with chloroform—and, if chloroform is demanded, morphine is contra-indicated. In operations on the nose and throat, if the pharynx is liable to become flooded with blood during the operation, morphine would better be avoided owing to its inhibiting influence on the cough reflex. The standard dose of morphine for an adult of ordinary physique is 0.015 gm.; and in big, muscular individuals, especially of the alcoholic type, larger doses, 0.02-0.03 gm. On the other hand, in the old, and the fragile, or in puny adolescents, a smaller dose is desirable —0.01 gm. or possibly even as little as 0.008 gm. When prescribing scopolamine, the physician should order it in 0.0006 gm. doses. In young adolescents and the aged, it is better not to employ it. Atropine can be given in 0.0006 gm. doses at almost any age, certainly from two years upward. There is a tendency for too small a dose to be given; especially in the case of children. The younger the child, the more likely are the secretions to be excessive under the stimulus of ether, and the narrower the airway. For children under two years, 0.0003 gm. may be given before ether and none before chloroform. Experience is against oral administration. If it is attempted, double the dose should be given four hours before the operation. The best way to give alkaloids is hypodermically and one hour before that fixed for the operation. The effect of the alkaloids is at about its height between one and two hours after administration; thereafter it generally declines, and is lost about two hours later on. On the other hand, alkaloids do not, as a rule, develop their action in less than half an hour.

Thirst Produced by Scopolamine. This thirst may be relieved, according to E. Erlenmeyer,[8] by the liberal administration of water before the patient goes to sleep. This empiric fact is somewhat difficult to reconcile with what is known about the depression of the secretory nerve endings by this drug. Possibly it rests upon suggestion; but it is a useful clinical observation just the same.

SEDATIVES

Dosage of Sedatives for Children. The use of sedatives in infancy and childhood is probably not resorted

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(8) Therap. Halbmonatsh., April 1, 1920.

to so often as desirable because of difficulty experienced by the general practitioners in apportioning dosage according to age. It is well known that, as regards dosage, the infant is not merely a small adult. The active and yet harmless dose can not be merely calculated by a scheme based on age or weight. In case of sedatives the action is to a great extent dependent upon the degree of excitation; and this is likely to be much more severe in the small child than in the adult because of the fact that the infantile brain is less endowed with inhibition than that of the adult. Hence, the following tables published by E. Goeppert,[9] which give the active and yet harmless dose of a number of sedatives are likely to be welcomed, especially in view of the fact that they have been determined in nearly every instance by clinical administration in healthy and sick children.

Opium: The opium preparation preferred by Göppert is the extract of opium, 1 gram of which represents about 2 grams of opium:

CHILDREN'S DOSAGE

Age	Ext. Opium	Tr. Opium
3–6 months	0.0002–0.0004	0.004–0.008
7–12 months	0.0008–0.001	0.016–0.02
2 years	0.001–0.0015	0.02–0.03
3–4 years	0.003–0.005	0.06–0.10
5–6 years	0.01	0.2
7–10 years	0.01–0.02	0.2–0.40
10–14 years	0.03	0.6

The corresponding dosage of tincture of opium has been calculated on the relation of strength of one to twenty for these two preparations. In this connection it should be noted that the drops of tincture of opium are very small and that we should calculate not 20 but 45 drops per c.c.

Göppert adds that this dosage should never be ordered every two to four hours but at first only two or three times daily; and that the dose be gradually increased until the desired action is produced; for with children even more than with adults it is impossible to determine without trial the desirable sedative dose.

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(9) Therap. Halbmonatsh., Jan. 1, 1920.

Bromural and Adalin. These are considered by Göppert harmless and yet active hypnotics provided they are given in sufficiently large dosage. He finds them especially useful in the various infectious diseases, provided severe pain is not the cause of the restlessness. They are to be preferred, he thinks, to all other cough sedatives in the treatment of whooping cough.

Age	Bromural Dose	Adalin Dose
1– 2 months	0.15	0.1 –0.15
3– 6 months	0.15– 0.45	0.25
7–12 months	0.3 – 0.6	0.5
2 years	0.3 – 0.6	0.5
3– 6 years	0.3 –(–0.9)	0.5 –0.75
7–10 years	0.3 –(–0.9)	0.5 –0.75
10–14 years	0.3 –(–0.9)	

Ethyl Carbamate (Urethane): This is a useful remedy in infantile convulsions, as well as the best sedative in spastic bronchitis and asthma, provided sufficiently large doses are employed. In whooping cough used in enema or by mouth, it is an efficient sedative free from danger. It should be employed in all cases in which dyspnea dominates the clinical picture, as in septic endocarditis, pneumonia, stenosis, etc. Should the dose not have the desired effect, two-thirds of the dose may be given after an hour.

URETHANE

Age	By Mouth, Gram	By Enema, Gram
1– 2 months		1.0
3– 6 months	0.5–1.0	1.5
7–12 months	1.5	1.5–2.0
2 years	1.5	1.5–2.0
3– 6 years	2.0	3.0
7–10 years	2.0–2.5	3.0
10–14 years	3.0	

The following method of administration is suggested:[1]

Ethyl Carbamate	10.00 gram
Syrup of wild cherry	45.00 c.c.
Water, enough to make	90.00 c.c.

Mix. Label: Tablespoonful as required.

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(1) For method of administration by rectum see article by Göppert on page 155, this volume.

Barbital (Veronal) and *Phenobarbital* (Luminal); The following dosage is given:

Barbital	Sodium,	Phenobarbital
Age	Dose	Dose
3– 6 mo.	0.05 gram	0.05 gram
7–12 mo.	0.05 gram	0.05 gram
2 yr.	0.1 gram	0.1 gram
3– 6 yr.	0.1–0.2 gram	0.2 gram
7–10 yr.		0.3 gram

Chloral hydrate: This may be called the morphine of childhood, to be used in all conditions of severe excitement, and in convulsions. The difference between active and harmful dose is great. We should avoid, however, frequent repetition or the use for many days in succession. The effect produced by chloral may be prolonged by ethyl carbamate, which is to be preferred to chloral in all conditions of dyspnea.

CHILDREN'S DOSAGE OF CHLORAL HYDRATE BY RECTUM

Age	Amount
1– 2 months	0.1–0.2 gram
3– 6 months	0.3 gram
7–12 months	0.5–0.8 gram
2 years	1.0 gram
3– 6 years	1.0–1.5 gram
7–10 years	2.0 gram
10–14 years	2.0 gram

To spare the stomach, this remedy should be given only by rectum. By mouth about two-thirds of the dose should be administered, as one must expect some loss on rectal administration. The effect develops in from thirty to forty minutes. Should the desired action not be obtained after forty minutes, one-half or two-thirds of the dose may be repeated. For details of administration see next article.

Sedative Therapy in Infantile Convulsions. F. Göppert[2] advises that, in case the convulsions have ceased when the physician arrives, he should act as though they still continued, unless he is easily accessible, and except in convulsions that obviously indicate the beginning of a

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(2) Therap. Halbmonatsh., Jan. 15, 1920.

fever in a child over two years old (in which case cool trunk compress and antipyretics would be indicated).

Chloral hydrate, Göppert thinks, is the single most important remedy in infantile convulsions. A physician should never be without a supply of this remedy, so that he may not have to wait at the sick-bed until a prescription can be filled. Göppert suggests that the chloral hydrate be carried in 10 per cent. aqueous solution, of which the proper dose (measured by means of a hypodermic syringe for doses below a teaspoonful), diluted with at least four times as much water is administered by injection into the rectum.

RECTAL DOSAGE OF 10 PER CENT. CHLORAL HYDRATE SOLUTION

1– 2 months	1– 2 c.c.
3– 4 months	2– 3 c.c.
5– 6 months	3– 4 c.c.
7–12 months	5–7.5 c.c.
2 years	7–10 c.c.
3– 4 years	10–15 c.c.
5–14 years	15–20 c.c.

For the injection, the author prefers a piston syringe with removable soft rubber attachment. The patient should lie on the left side with his back toward the physician. The left hand is laid upon the right buttock, in such a way that the tips of the fingers clasp the anterior iliac spine, and the thumb is placed slightly anterior to the coccyx. The moment the injection is completed the thumb promptly presses the anal opening forward by means of a bit of cotton. In this manner closure is more efficiently obtained than by pressing together of the nates. Pressure for ten minutes usually suffices for retention. The maneuver might be repeated, if not successful the first time; and one-half or two-thirds be administered if one is not certain how much has been lost.

The effect of such an injection appears in from twenty to forty minutes. If a full dose of chloral remains without effect, it might be fortified by a full dose of urethane.(3) Usually, however, the reason for the failure is found in serous meningitis. This state must be overcome by spinal puncture, before the chloral action can assert itself.

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(3) Page 153, this volume.

Chloral is contraindicated in the presence of cyanosis in a child suffering from grave bronchitis. However, cyanosis and tracheal rattling occurring merely during the convulsions is not a contraindication. It is also indicated in cachectic children suffering from chronic anteritis (agonal convulsions).

In those cases in which chloral is contraindicated, ethyl carbamate (urethane) should be used, which is best kept in form of the following solution:

Ethyl carbamate	20 gm.
Choral hydrate	1 gm.
Water, to make	200 gm.

Of this solution one uses for a rectal injection for a child of:

1 to 3 mos.	10 c.c.
4 to 6 mos.	15-20 c.c.
6 to 12 mos.	20-25 c.c.
1 to 2 years	20-30 c.c.

To be injected slightly warmed undiluted or else diluted with an equal amount of warm water.

Luminal sodium is to be preferred to chloral hydrate, because it can be given hypodermically, in spasmophilic convulsions, which may be assumed to exist in a child from 7 to 18 months old, which is not extremely emaciated, and especially when the child has been previously subject to convulsions or laryngospasm. This drug must not be kept in solution, as it precipitates easily. It is best kept in powders of 0.2 gm. each, one of which is dissolved in 2 c.c. of water in a teaspoon, in which it is boiled for a moment. The total quantity may be injected in a child from 7 to 18 months old. Luminal has the same contraindications as chloral.

Sedative Treatment of the Insane in Private Practice. For the general practitioner it is of considerable practical importance to know what to do for a patient who has suddenly become violently insane before he can be committed to an institution. Rest in bed and warmth are the two prime essentials, as noted by A. Erlenmeyer,[3] who goes on to say that if the patient can not be kept warm in bed, warm baths at from 35 to 34° C. (95° F.) should be administered for one, two or more hours, or even continuously in extreme cases. Maintenance of the proper temperature by addition of warm water; and constant supervision to prevent the patient's drowning himself by putting his head under the water are, of course, required. In case a tub is not available, a properly applied [cold] wet pack, [which becomes warm under the covering—Ed.] for not longer than an hour is useful. If such packs are left on longer, heat, stagnation and consequent rise of temperature may occur.

The required evening dose of hypnotic, which often must be very large, may frequently be considerably diminished by administering divided doses throughout the day. Thus may be given: 0.5 gm. chloral hydrate, twice a day, or from 0.5 to 0.8 gm. sulphonmethane (sulphonal), two or three times daily, or 0.5 gm. sulphonethylmethane (trional), with from 0.2 to 0.3 gm. acetphenetidine, an excellent combination, or from 1.5 to 2.0 of bromide, or various combinations of these.

While this treatment usually succeeds, in the severest cases in which it will fail there is only one remedy that dominates the situation: scopolamine and morphine, subcutaneously. Erlenmeyer recommends 0.01 gm. of morphine and 0.001 gm. of hyoscine as the first dose in a healthy man with a strong heart. Usually it is best to use half a dose or less initially. The effect of a sufficiently strong dose will show itself in from twenty to twenty-five minutes. The patient should be given water freely, as the scopolamine will make him thirsty. As this alkaloid is almost tasteless, it may be administered by mouth if the patient is willing to swallow; though, of course, the effect is not nearly so powerful as after the injection. The suitable dose of a 2:1000 solution is from 15 to 20 drops in coffee two or three times daily.

Of course, the patient's nutrition must be taken care of; and, if ordinary feeding is impossible, nasal or stomach-tube feeding must be resorted to.

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(3) Therap. Halbmonatsh., Feb. 1, 1920.

Sedatives in Nervous Vomiting. K. Giesemann[4] recommends rectal administration of the following remedy, which should be given in full dose, so that a reliable effect be obtained; for success has an important psychic effect in giving the patient confidence in his physician as well as in himself.

℞

Chloral hydrate	1.0 gm.
Sodium bromide	2.0 gm.
Mucil. salep	10.0 gm.
[Acacia probably as good.—Ed.]	
Water to make	50.0 ml.

Label: Inject as enema at body temperature.

In tuberculous individuals the author would not advise the use of chloral. In such persons he prefers the administration of 0.5 gm. barbital sodium dissolved in water with the addition of a little mucilage.

It is advisable to continue the medication for a few days; usually the remedy may then be discontinued, without recurrence of the emesis.

Sedative Enema in Prostatic Irritation. An enema composed of 0.3 gm. antipyrine and 0.03 gm. dionin, dissolved in water and given every other night, has been found by K. Giesemann,[5] not only to give sleep but also to make the patient more tolerant of local vesical treatment, and to improve his condition in other ways as well. The author does not fear the creation of a dionin habit.

Sedatives in the Night Sweats of Phthisis. K. Giesemann[6] recommends, in milder cases, bromural 0.6 gm. in more severe cases, barbital 0.5 gm., given at bed-time. Soon a dose every second or third day suffices. He has found this treatment superior to atropine, which though the most active of the remedies recommended for this purpose, has the most disagreeable by-effects. Calcium he has found active in some but useless in other patients.

Chloral in Cardiovascular Disease. A. Glaus[7] has found chloral a very useful means of combating insomnia in patients with heart or vascular disease, especially in high blood-pressure cases. In these, the ordinary sedatives—outside of opium—often fail to relieve. Accord-

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(4) Therap. Halbmonatsh., Jan. 15, 1920.
(5) Ibid.
(6) Ibid.
(7) Schweiz. med. Wochenschr., Sept. 16, 1920.

ing to this author, moderate degrees of cardiac insufficiency with signs of stasis in the lungs and swelling of the liver do not contraindicate this treatment, but severe degrees of cardiac insufficiency do.

PHENOBARBITAL

Phenobarbital (Luminal). This drug was introduced into use in Europe shortly before the war, and during the war was not obtainable in this country. Hence, the medical profession in general is not so well acquainted with luminal, at present, as it ought to be, not only in view of the fact that the drug is a powerful and reliable hypnotic, frequently succeeding in producing sleep when barbital fails; but also because of its undeniable value in the treatment of epilepsy. As may be expected, this substance has detrimental effects that it is likewise necessary for us to become acquainted with.

The following description of its physical properties is taken from "New and Non-Official Remedies," 1920.

Dosage.—From 0.2 to 0.3 gm. increased if necessary to 0.8 gm. A maximum dose of 0.8 gm. should not be exceeded. Smaller doses are sometimes efficient. [A dose of 0.1 gm. is very often sufficient.—Ed.]

Luminal is a white, odorless, slightly bitter powder. It is almost insoluble in cold water, slightly soluble in hot water; soluble in alcohol, ether and chloroform, and in alkaline solutions. It is generally marketed in the form of tablets each of which contains 0.10 gm. of luminal.

There is also a soluble preparation of luminal known as luminal sodium (phenobarbital sodium), which is a white, hygroscopic powder; very soluble in water; soluble in alcohol; practically insoluble in ether and chloroform.

Luminal-sodium is chiefly used for hypodermic injections in the form of 20 per cent. solution, prepared by dissolving the salt in boiled and cooled distilled water; 2 c.c. of the solution contain 0.4 gm. of luminal-sodium. The dose of luminal-sodium is 10 per cent. greater than that of luminal. Luminal-sodium may be given hypodermically in doses of 0.1 to 0.3 gm.

Langstein[8] found the action of ampoules containing a solution of luminal-sodium to be unreliable; and ascribes

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(8) Therap. Halbmonatsh., June 1, 1920.

this result to the sediment that forms in the ampoules, though he is unable to prononuce upon the nature of the sediment. Hence this drug should not be dispensed in ampoules.

Phenobarbital (Luminal) Therapy in Epilepsy. A. A. Friedländer,[9] who was one of the first to employ luminal in epilepsy (1912), believes that it is likely to mean an important advance in the symptomatic therapy of epilepsy. Luminal is superior to bromide in that it is active even in severe cases—since using luminal Friedländer has not found it necessary to resort to the opium-bromide combination—that it is more pleasant and better tolerated than bromide, that kidney disease is no contraindication to its use, and that it has a favorable influence upon the patient's mental condition. However, this drug is not free from danger; and, in severe cases, ambulatory treatment is decidedly inadvisable. Dizziness, nausea, and exanthem are some of the untoward results produced by it.

The following initial dosage is recommended:

1 to 2 years	0.005-0.01	(caution!)
2 to 4 years	0.01 -0.04	
4 to 6 years	0.04 -0.06	
6 to 8 years	0.06 -0.08	
8 to 10 years	0.08 -0.10	
Adults	0.10 -0.20	

The following simple prescriptions are used:

℞
Luminal
Sugar, of each .... 1.0-3 gm.
Mix and divide into 10 powders.

℞
Luminal sodium .... 0.5 gm.
Cocoa butter .... 1.0 gm.
Mix and make suppository. Dispense 5 such doses. Label. Use one at bedtime.

℞
Luminal sodium .... 2 gm.
Sterilized distilled water, to make.......... 10.0 c.c.
Label. 2 c.c. (=0.4 luminal sodium) for injection. Must always be freshly prepared.

Owing to its hypnotic tendency, the remedy is best administered an hour before bedtime and, in milder cases,

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(9) Therap. Monatsh., December, 1919.

a single dose daily suffices. If a second dose is required, it is best given during the afternoon. In severe cases in which luminal must be given several times daily bed treatment is required, as it would also be with bromide therapy. In very severe cases, as much as 0.3 has been given three times in the twenty-four hours, the last two doses at 6 or 9 p.m.

When the attack had been controlled, the next step is the determination of the smallest dose that will prevent recurrence. This may be accomplished by administration every other day, or, when this has proved successful by giving the remedy every third evening, in which manner it may have to be continued for a long time.

H. Kress[10] considers luminal to be next in value to bromide in the treatment of epilepsy, and in some respects to be superior to the latter. He believes that the reason for this special action of luminal lies in the fact that its molecule contains a benzol ring, which adds to the usual action of the hypnotics of the fatty series a sedative influence upon lower cerebral centers, making it a motor depressant, as well as an analgesic.

He finds that this remedy is efficient in doses of 0.10, from two to four times daily, and that, in some cases, as little as 0.05, twice daily, is quite enough. He emphasizes particularly the psychic and physical comfort and improvement of mental energy testified to by various patients. This is in strong contrast to bromide treatment.

He feels confident that the recently advocated sulphonethylmethane (trional) treatment is inferior to luminal, because of the hypnotic action of motor depressent doses of the former, as well as because of the danger of trionalismus characterized by heart weakness, anemia, and polyneuritis.

[Phenobarbital has been strikingly beneficial in several cases of epilepsy known to me.—Ed.]

Julius Grinker[1] likewise reports satisfactory results from the administration of luminal in over 100 cases of essential epilepsy. He usually prescribes luminal in doses of 0.10 gm., either in tablet or capsule, to be given at night before retiring. The patient is instructed to report within a few days. If the dose administered suf-

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(10) Therap. Halbmonatsh., April 1, 1920.
(1) Jour. Amer. Med. Ass'n, Aug. 28, 1920.

fices to reduce the attacks or cause them to subside, it is given regularly in the same manner. If this dose is found to be insufficient it must be increased to 0.12 gm. given at night. Should this dose also prove too small, then another daily dose of luminal is added to the preceding one. In that event a small dose, say 0.06 gm. is given in the morning, while the larger dose is administered before retiring. Only rarely need three daily doses of luminal be given; though cases do occur in which 0.20 gm. three times daily are required. After several days or weeks it will usually be possible to return to the smaller doses. When drowsiness and apathy appear, the dose is reduced. The treatment must be continued systematically for years; any interruption is likely to be followed by a number of severe attacks, as is also the case with bromides. Even moderate doses of luminal seem to exert a favorable effect on the minor attacks, a condition in which the bromides are comparatively ineffective. Grinker has seen only two patients with rashes that necessitated a discontinuance of the luminal treatment.

Effect of Overdose of Phenobarbital. J. Stein[2] reports marked dizziness, diplopia, faintness, nausea and vomiting, occurring in a powerful man after ingestion of 0.3 gm. of luminal. In consequence, Stein recommends that luminal should not be put up in tablets of more than 0.1 gm. per dose, and that 0.3 gm., should be looked upon as the maximal dose to be exceeded only in most exceptional cases.

W. Haug[3] reports two cases of poisoning resulting from prolonged administration of phenobarbital; in one case after four weeks of 0.1 gm. three times daily. The symptoms were fever, bloody and mucus diarrhea, moderate depression and scarlatiniform exanthem, all of which subsided on discontinuance of the drug.

TRIONAL

Sulphonethylmethane (Trional) in Treatment of Epilepsy. Braune[4] reports a series of twenty cases of epilepsy, taken care of in an insane asylum, in which he

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(2) Therap. Halbmonatsh., July 16, 1920.
(3) Münch med. Wochenschr., 1919, p 1494.
(4) Therap. Halbmonatsh., Feb. 1, 1920.

used sulphonethylmethane, generally in doses of 0.5 gm. twice daily, sometimes less, seldom more, with as much as and even better success than is obtained from the use of bromide. He considers sulphonethylmethane especially indicated in cases of epilepsy characterized by quarrelsomeness and other forms of mental irritability, as well as in those cases in which bromide acne renders the use of bromide undesirable. In other cases than the latter, combination with bromide has proved itself especially efficacious, 0.5 gm. of sulphonethylmethane and 2.5 gm. of sodium bromide having been found sufficient in most of cases. As sulphonethylmethane has an hypnotic action, it is best given at bedtime, while the bromide may be given throughout the day.

Among the untoward effects noted from this drug may be mentioned: tiredness, feeling of heaviness in the head, sleepiness, uncertain gait, dizziness, tinnitus, aural hyperesthesia, as well as hyperesthesia of the scalp, gastro-intestinal disturbances and, very rarely, impairment of vision. These phenomena are most likely to occur in feeble individuals; hence, this drug should be used with caution in cachectic patients; and during a course of treatment the patient's weight and nutrition should be carefully observed. Fresh air, frequent baths, and a daily bowel movement are of advantage. In cases in which larger doses are used, temporary interruption of the treatment is desirable.

The author also reports substantial improvement from treatment with sulphonethylmethane in several cases of chorea, as well as in several patients suffering from severe asthma, for whom, used at the beginning of an attack, it secured a night's quiet sleep.

A. Pilcz[5] criticizes Braune's recommendation of the use of sulphonethylmethane as an anti-epileptic in doses of 0.5 gm., especially in combination with sodium bromide, 2.5 gm., to be employed *continuously*. Pilcz points out that one of the chief reasons why sulphonethylmethane has been practically abandoned as a hypnotic was the danger patients incurred from continuous use of this drug, even deaths having been reported. He considers insufficient Braune's precautionary measures, namely:

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(5) **Therap. Halbmonatsh., May 15, 1920.**

good state of nutrition, liberal ingestion of alkaline waters, regular bowel evacuation (purging the patient twice a week), and watching the urine to detect oliguria or hematoporphyrinuria. True, Braune advocates temporary interruptions when doses higher than 0.5 gm. are given; and he cites cases in which the patients received, without interruption, as much as 400 gm. However, it would be advisable to be on the safe side by interrupting the remedy after continuous use of one to three weeks by as long a period.

ANTISPASMODICS

Belladonna in Biliary Colic. Eduard Müller[6] considers belladonna in liberal doses the single most valuable remedy in the treatment of gall-stone colic. He advises furnishing the patient with suppositories containing extract of belladonna in dose of 0.035 gm. and in severer cases even 0.05 gm., to which, if required, codeine phosphate (from 0.035 to 0.05) or morphine (from 0.015 to 0.025) may be added. These suppositories should be used at the very first warning of an attack, and the patient should at the same time lie down and apply heat to the hepatic region. This usually succeeds in putting the gall-bladder at rest and in mitigating an attack. On the other hand, in the presence of a fully developed attack, a subcutaneous injection of morphine is the best remedy. Müller also advises continuing belladonna treatment for several weeks after the attack, for the purpose of putting the diseased gall-bladder at rest as well as antagonizing retention of infectious material by spasm. A suppository is used morning and evening. In addition, he prescribes strict bed treatment until the patient not only is free from pain, but also from tenderness and rise in temperature on rectal examination.

To prevent constipation, which is a decided disadvantage in these cases, an artificial mineral water with addition of belladonna, to lessen the tendency to spasm of the involuntary muscles is prescribed:

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(6) Therap. Halbmonatsh., March 15, 1920.

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Extract of belladonna	0.5 gm.
Sodium bicarbonate	
Sodium sulphate, dried	
Powdered rhubarb	
Oil sugar of fennel, each	20 gm.

Mix. Label.—Knifepoint full in water 3 times daily after meals.

Atropine in Seasickness. P. Cazamian[7] gives a hypodermic injection of atropine (0.0012-0.002 gm.) which usually suffices to relieve the symptoms. Only occasionally has he found it necessary to administer 0.0006 gm. after from twelve to twenty-four hours. In late stages, when there is low blood-pressure and prostation, combination with epinephrine seems to be of advantage. Cazamian recommends 0.001 gm. of atropine injected hypodermically on embarking as a means of preventing seasickness. If weather conditions are bad the dose may be repeated for three days.

Subcutaneous Use of Lobelia. A. J. Nossaman[8] believes that lobelia is not understood, appreciated and used as much by the general practitioner as it should be. When lobelia is used subcutaneously, the dose is from 10 minims to 1 dram (of Lloyd's preparation for subcutaneous use), repeated as necessary, usually every two to four hours in acute cases and once or twice a day in chronic cases. From such doses, the author has never seen any bad effects except occasionally some vomiting, and that very rarely. He has never encountered an abscess.

In asthma he prefers it above all other remedies, and does not recall a case in which it failed to give relief. As an antispasmodic it is a powerful and harmless remedy, relieving spasmodic pains due to menstrual disorders, bowel disturbances, colics, and so forth, without the bad after-effects of morphine. There have been many failures, but he believes the fault mostly his own.

The author thinks that its greatest value is as an eliminant and it has given him satisfactory results in hyperemesis gravidarum and in septic arthritis.

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(7) Archiv. de méd. et pharm. nav., 1919; quoted by Brit. Med. Jour., Jan. 3, 1920.

(8) Colorado Med., June, 1920.

Benzyl Benzoate. J. Morton Boice[1] publishes a *résumé* of the work done by various observers on this at present popular non-narcotic antispasmodic succedaneum for opium, papaverine, etc. He points out that this drug is not absolutely new, as it is found in Nature in some of the balsamic resins, such as balsam of Peru and balsam of tolu; and that it is not improbable that the beneficial effects obtained from these balsams in asthma and phthisis are due to the presence of benzyl benzoate.

Reviewing the clinical results reported by various authors, Boice notes the following: In about forty cases of excessive peristalsis, and diarrhea, both acute and chronic, a few doses of 20 per cent. solution of benzyl benzoate were found to act as efficiently as opium, completely relieving the condition.

Benzyl Benzoate in Persistent Hiccoughs. David I. Macht[2] reports three cases of hiccough, that did not yield to ordinary medication, relieved by benzyl benzoate. Not only is benzyl benzoate a useful remedy in the treatment of certain persistent forms of hiccoughs but, in the author's opinion, it is also of diagnostic importance in differentiating between the hiccoughs of a purely central origin on the one hand, and those due to some peripheral origin on the other. Inasmuch as benzyl benzoate exerts its chief effect peripherally on the smooth muscle structures, the author is inclined to believe that this drug may be most useful in the treatment of hiccoughs of peripheral origin.

[The mode of action of benzyl benzoate was discussed in the Practical Medicine Series, 1919, Vol. VI, p. 158. —Ed.]

Benzyl benzoate exerts its action best when given in a 20 per cent. solution in alcohol. Of this solution the patient is directed to take from 20 to 40 drops in water or milk. The author has not found it either convenient or advantageous to administer the drug in suspension, or in elixirs or syrups; and administration in capsules has been found by him in some cases to produce local irritation, and in others to render the therapeutic action too

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(1) New York Med. Jour., Dec. 13, 1919.
(2) Med. Record, July 24, 1920.

slow. To children, the solution can be conveniently administered in sugar water or milk.

Benzyl Benzoate in Circulatory Disorders. D. I. Macht[3] calls attention to the therapeutic value of benzyl benzoate in treatment of certain disturbances of the circulation.

After injection of benzyl esters, a fall in blood-pressure is noted which can be shown to be due to a peripheral vasodilatation, the fall being a result of a depressor action of the drug on the smooth muscle cells of the arterial walls. The effect on the vasomotor center after ordinary doses is negligible and unimportant. The effect on the heart itself, after small doses of benzyl benzoate, is negative. Such an action is well illustrated by the accompanying curve, which shows the effect of an intravenous injection of an emulsion of benzyl benzoate in a dog (Fig. 17).

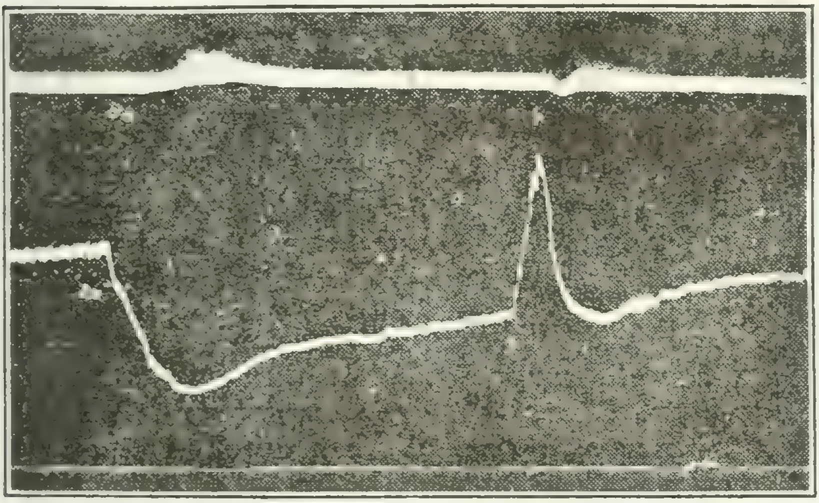

Fig. 17. Dog, 8 Kilos. Paraldehyde anesthesia. Upper curve shows respiration; middle curve shows blood-pressure; lower curve the time in five seconds. At BB, twenty mg. of benzyl benzoate in the form of an emulsion was injected into the femoral vein. At Ep, one mg. of epinephrine solution was injected. Note the fall in blood-pressure and the lack of depression in the respiration and heart beat. Note also the prolonged duration of the benzyl effect on the blood-pressure, with a gradual return to the normal level.

The indication for its administration is obviously a

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(3) New York Med. Jour., Aug. 28, 1920.

spastic contraction of the arteries, or angiospasm; and the drug has been given with very satisfactory results to patients exhibiting such a condition. It was found effective in cases of high blood-pressure, irrespective of the etiology, wherever the arteries were not calcified and were anatomically capable of dilatation. In most of the patients, the reduction of blood-pressure was accompanied by an improvement in the general condition. Thus, patients who complained of precordial pain or oppression showed decided improvement in that respect.

The most convenient and effective form of administration is a 20 per cent. alcoholic solution of benzyl benzoate administered by mouth, either in cold water or milk. Ordinarily, a dose of 20 or 30 drops of such solution, taken three or four times a day suffices. It has been found that after administering to a patient full doses of benzyl benzoate and obtaining a desirable therapeutic effect the reduced pressure may be maintained by keeping a patient on very small doses of the drug, sometimes no more than 5 minims of the 20 per cent. solution.

The effect of benzyl benzoate on the blood-pressure was demonstrable even in cases in which nitrites failed to produce a vasodilatation. The onset of the benzyl effect, however, is not so rapid as in the case of nitrites; but the duration of the benzyl effect is much longer than that of the nitrites, with the possible exception of erythrol tetranitrate. The blood-pressure sometimes remained at a low level for several days after discontinuing the drug. However, patients become habituated to benzyl benzoate and will not react so promptly to it later as at the beginning of the treatment. Its action is, of course, a purely symptomatic one. Reduction of the blood-pressure is not always beneficial and may be harmful as in cases of renal disease. In such cases, benzyl benzoate should not be used any more than nitroglycerine or sodium nitrite.

In angina pectoris, the best method of employing it would seem to be between the acute anginal attacks. For the acute attacks, the effect of benzyl benzoate by mouth would be too slow; and, in order to relieve the patient, it would either have to be given by subcutaneous injection in oil or, still better, the attack should be combated with a whiff of amyl nitrite.

Benzyl Benzoate in Angina Pectoris. A. B. Spach[4] reports seven cases of angina pectoris, in which benzyl benzoate regularly produced relief of pain when given in doses of 25 drops of a 20 per cent. alcoholic solution in water, at intervals of every three or four hours.

Benzyl Benzoate Non-Leukotoxic. E. A. Heller and E. Steinfield[5] undertook to ascertain whether benzyl benzoate, being a close chemical derivative of benzol, had the leukotoxic effect of benzol, an action for which the latter was formerly used as a therapeutic agent in leukemia.

Rabbits were given subcutaneous injections into the loose tissues of benzyl benzoate in equal parts of olive oil, and their condition compared with rabbits used as controls. This work showed that benzyl benzoate was without toxic effects on the leukocytes of rabbits, while controls of benzol showed the well-known depression of the leukocyte count. It is evident that a wide margin of safety is present between the therapeutic doses and the toxic doses of benzyl benzoate.

The Antisposmodic Value of Chelidonine. According to studies of the pharmacodynamics of this alkaloid of *Chelidonium majus* (tetterwort), which resembles papaverine chemically, P. J. Hanzlik,[6] finds its action also similar. The author arrives at the conclusion that the drug should be useful against spasm of smooth muscle, as in angina pectoris, hypertonia, asthma, and intestinal and uterine colic. Being obtained from a weed, it ought to be cheaper and more readily procurable than papaverine and, like the latter, more easily and conveniently administered than the benzyl esters which are disagreeable to many patients.

STIMULANTS TO CIRCULATION

The Activity of American Digitalis. J. H. Pratt and Hyman Morrison[8] arrive at the conclusion that the best American digitalis, both wild and cultivated, is equal in activity to the best European digitalis. Specimens of high potency have been obtained from Virginia, Ne-

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(4) Illinois Med. Jour., Jan., 1921.
(5) New York Med. Jour., July 31, 1920.
(6) Jour. Pharm. and Exp. Therap., May, 1920.
(8) Jour. Amer. Med. Ass'n., Nov. 22, 1919.

braska, Wisconsin, Minnesota, Oregon and Washington. However, no less than seventeen out of twenty-five samples of American digitalis were below the standard of strength established by the U. S. Pharmacopeia. Nevertheless, the average strength of the American digitalis was greater than that of the imported digitalis which the authors examined. All digitalis, they declare, should be tested biologically before it is gathered in large quantities for therapeutic use.

Digitalis Activity Increased by Calcium. E. Starkenstein[9] calls attention to an increased activity of digitalis in cases of typhus that were under treatment with calcium chloride. Remarkably early bradycardia (below 40:) was repeatedly observed. Equivalent calcium or digitalis dosage alone did not produce such effects. This is in accordance with observations made by O. Loewi, 1917, upon animals, on the strength of which this investigator warned against simultaneous administration of these remedies.

Fever Increases Toxicity of Digitalis. A. D. Hirschfelder, J. Bicek and F. J. Kucera[1] found, by experiments on frogs, that the degree of toxicity of digitalis increases progressively with increased temperature, at which the experiment is conducted, and that in cats hyperthermia produced by immersing them in a bath of warm water more than doubled the toxicity of this drug. The increase in toxicity at higher body temperature must, therefore, be borne in mind, particularly when administration of the large doses recommended by Eggleston and Robinson are contemplated.

Some Newer Concepts in Digitalis Therapy. Cary Eggleston[2] summarizes as follows the actions of digitalis when administered in therapeutic doses:

It may slow the rate of the whole heart through stimulation of the vagus center.

It may prolong the time of auriculoventricular conduction through a similar action.

It may slow the rate of the ventricles, either by the production of some degree of heart-block through central

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(9) Therap. Halbmonatsh., April 1, 1920.
(1) Jour. Pharm. and Exp. Therap., May, 1920.
(2) Amer. Jour. Med. Sciences, November, 1920.

vagal stimulation or by virtue of some direct action on the heart.

It seems probable that it may exert a direct action on the myocardium which results in an increase in the force or magnitude or both, of ventricular systole.

The only large group of cases in which digitalis produces marked reduction in the heart-rate is that of auricular fibrillation. When the normal sinus rhythm is present, slowing can not be regarded as one of the primary characteristic therapeutic actions of digitalis.

The recognition of this fact reveals the fallacy of one of the chief objections advanced against the administration of digitalis in cases of heart failure due to aortic insufficiency. Extensive clinical observations have shown conclusively that while there is an increased tendency for digitalis to enhance a pre-existing depression of conduction or partial block, it is by no means contraindicated in cases of this type. In many cases it may be administered with satisfactory results without further prolongation of conduction time or increase in heart-block.

If the administration of digitalis does show a tendency to increase an existing impairment of conduction, this can generally be overcome by the administration of suitable doses of atropine. Some delay in conduction time is an almost invariable phenomenon of digitalis action, though the depression is not usually very marked until the stage of minor digitalis intoxication is reached. It seems quite probable that the delayed conduction may constitute an action of digitalis which is of some therapeutic value as it means a considerable increase in the time allowed for the auricles to empty into the ventricles.

There is no evidence that either digitalis or digitoxin has any direct action on the blood-vessels when given to man in even large therapeutic doses. It was found that the changes in the systolic and the diastolic pressures are generally relatively slight, the tendency being for the pressures to be altered in the direction of the normal. There is a marked tendency for the pulse pressure—the difference between the systolic and diastolic pressures—to increase under the influence of digitalis, chiefly through reduction of the diastolic pressure, in cases of heart failure, in which the failure is relieved. A decided fall in the systolic pressure is to be anticipated when digitalis relieves heart failure in cases in which it is accompanied by high systolic pressure and marked edema. There is also a marked tendency for digitalis to reduce the systolic pressure from its high level in cases with marked dyspnea, cyanosis and circulatory stasis. All the facts show conclusively that digitalis is not contraindicated by the existence of high blood-pressure.

Some recent text-books state that in toxic doses at least digitalis may produce a dangerous constriction of the coronaries, and it has also been argued that when pulsus alternans is produced or aggravated by digitalis the phenomenon is due to coronary constriction. These beliefs have also been responsible for the view that digitalis is contraindicated in patients with so-called angina pectoris. These ideas are misleading and erroneous. The digitalis bodies do not constrict the coronaries of the heart *in situ*. In fact, digitalis seems to dilate them actively. Digitalis is often of great value in cases with pulsus alternans and not infrequently restores the normal rhythm, at least temporarily. Anginal pain is usually but a symptom of heart failure, and the control of the failure by the administration of digitalis frequently relieves the pain. In such cases the continued or intermittent use of digitalis, by preventing the recurrence of failure, often also prevents the recurrence of the pain.

The diuretic action of digitalis in man is essentially secondary to its capacity to relieve heart failure and restore circulation. When adequate digitalization fails to produce diuresis in a patient with edema and heart failure, it will almost invariably be found that either the heart failure has not been relieved or that the failure is complicated by nephritis, which then demands appropriate treatment.

The proper administration of digitalis demands the ability to judge the degree of digitalization which is being produced. In cases which respond favorably there is a group of phenomena, both subjective and objective, which indicates more or less effective digitalization and which may be embraced by the term, "clinical improvement." When well developed, they usually indicate adequate digitalization and the discontinuance of the drug or a reduction in its dose. The following phenomena are indicative of some degree of digitalis intoxication and their appearance demands the cessation of further administration or a sharp reduction in the dose: Nausea or vomiting; marked grade of sinus arrhythmia, especially when phasic in type and independent of respiration; partial or complete heart-block; premature contractions; the "coupled rhythm" due to the regular recurrence of a premature contraction after each regular beat; auriculoventricular dissociation; the A-V or nodal rhythm; ventricular tachycardia; other rare disturbances of the cardiac rhythm. These arrhythmias of digitalis intoxication must be distinguished from those due to the heart failure itself. This can frequently be accomplished only as the result of the most careful and constant observation of the patient from the outset, usually with the aid of graphic records, for it is impossible to distinguish without knowledge of the previous condition whether block, premature contractions, etc., are due to digitalis or to the progress of the heart failure.

Eggleston finally discusses three general plans of dosage:

1. *Small dose method:* From four to six days are generally required for digitalization by this method; from 0.12 to 0.25 gm. of the powdered leaf or from 1.25 to 2.50 c.c. of the tincture should be administered every four hours—four doses daily—and continued until digitalization is induced.

2. *Large Dose Method:* From one to two days are required for digitalization. During the first twenty-four hours a dose of 0.40 gm. of the powdered leaf or 4 c.c. of the tincture should be administered every six hours, day and night, for four doses. On the second day the dose should be reduced one-half and the interval may be shortened to four hours, giving four doses a day and none at night. This latter dose and interval should be continued until full digitalization is secured.

3. *The Body Weight Method* (Described below): This permits full digitalization within from ten to twenty hours from the beginning of the administration and is especially serviceable in cases manifesting urgent symp-

toms. This makes it possible to do away with the necessity for the intravenous or intramuscular administration of ouabain, strophanthin, or some other digitalis preparation.

The preparation selected should always be one which has been assayed biologically and proved to be of high activity. The powdered leaf and the tincture are the most satisfactory preparations. The powdered leaf is especially to be commended because it can be dispensed in capsules. Of the many proprietary preparations and specialties which are offered with high claims for oral administration none is superior to the powdered leaf or tincture of high grade, and most are decidedly inferior. All are quite costly and the price of some is exorbitant. Strophanthus, owing to the poorness and the irregularity of its absorption, should never be used for oral administration to man on account of the danger of serious accident, despite the fact that it often has been so used with satisfactory results.

Digitalis of high grade is generally well absorbed from the digestive tract of man, and it seems apparent that the absorption of a single dose is completed within six hours. These observations are quite at variance with the rather general belief that digitalis is slowly absorbed. That belief seems to have been based on the older mistaken idea that from three to six days were always required to secure digitalization in man, which, in turn, arose from the administration of single doses which were too small. We know now that digitalis is fairly rapidly absorbed and that full digitalization can be secured by oral administration certainly within twenty-four hours after the first dose, and frequently within ten hours.

The action of digitalis upon the human heart may persist for periods up to two weeks or longer after administration has been stopped. This persistence of action accounts for the phenomenon previously called "cumulation." It is quite unnecessary to administer digitalis at the short intervals customarily observed. It is never necessary to administer a dose oftener than every four hours, and a six-hour interval is generally preferable. When a patient is to be kept upon the continuous administration of a small dose of digitalis this need be taken only once daily. Finally, the persistence of action must always be kept in mind when one considers the administration of ouabain (crystalline strophanthin) or amorphous strophanthin intravenously or intramuscularly, for the doses of the latter are commonly large, in terms of activity, and serious or fatal poisoning has occurred from such injections in patients who have recently been receiving digitalis. The rate of elimination of digitalis is such that from 0.10 to 0.12 gm. of digitalis (1.0 to 1.3 c.c. of the tincture) can generally be administered over long periods of time to prevent recurrence of heart failure, and without producing intoxication.

Administration of Digitalis by "Eggleston Body Weight Method." C. Eggleston[3] describes this method for rapid digitalization by oral administration as follows: The activity of the drug is determined by the cat method of Hatcher, the unit being the weight of dry drug, in miligrams, which is required to kill 1 kg. of cat when a solution is injected slowly and continuously into the vein. This amount is called a cat unit. High grade specimens of digitalis, when not assayed by the cat method, may be regarded as having an average activity of 100 mg. to the cat unit. The average total amount of digitalis required for oral administration to man is 0.15 of one cat unit per pound of body weight.

To calculate the average total amount required by any one patient, we proceed as follows:

1. The patient's weight is determined in pounds, (minus edema).
2. The cat unit of the digitalis is determined.
3. One of the following formulas is applied:

Formula I: $\dfrac{C.\ U. \times 0.15 \times W}{1{,}000}$ = Grams of powdered leaf in total amount

Formula II: $\dfrac{C.\ U. \times 0.15 \times W}{100}$ = Cubic centimeters of tincture in total amount

Formula III: $\dfrac{C.\ U.}{100} \times W$ = Cubic centimeters of infusion in total amount

"In these formulas, C. U. is the number of milligrams in one cat unit and W. is the patient's body weight in

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(3) Jour. Amer. Med. Ass'n., March 13, 1920

pounds. The following example illustrates the use of these formulas'':

''A patient weighs 150 pounds, and the digitalis available has an activity of 100 mg. to the cat unit. Applying Formula I for the powdered leaf, we have 100 × 0.15 = 15; 15 × 150 = 2,250; 2,250 ÷ 1,000 = 2.25 = grams of leaf in total amount.''

''Applying Formula II for tincture, we have 100 × 0.15 = 15; 15 × 150 = 2,250; 2,250 ÷ 100 = 22.5 = cubic centimeters of tincture in the total amount.''

''Formula III gives 100 ÷ 100 = 1; 1 × 150 =150 = cubit centimeters of the infusion in the total amount.''

Administration of Average Calculated Total Amount.

1. When the patient has received no digitalis within the preceding ten days.

A. In urgent cases: From one-third to one-half of the total calculated amount is administered at the first dose. After an interval of six hours, from one-fifth to one-fourth of the total amount is administered. After a second six hours, from one-eighth to one-sixth of the total is administered. Thereafter, if more digitalis is needed, about one-tenth of the total may be repeated every six hours until maximal digitalization is secured. In the case of the example given above with the total amount being 22.5 c.c. of the tincture, the first dose would be from 7 to 11 c.c.; the second from 4 to 5 c.c.; the third from 2.5 to 3.5 c.c., and thereafter about 2 c.c. every six hours if required.

B. Rapid, for non-urgent cases: About one-fourth of the calculated total is to be given at each of the first two doses, six hours apart. Thereafter from about one-tenth to one-eighth of the total is given every six hours.

2. When the patient has been taking digitalis within the preceding ten days: Before further digitalis is prescribed, the patient is to be subjected to the most careful examination, including the use of polygraphic or electrocardiographic records if available, to determine whether or not there are any evidences of digitalis action.

(*a.*) *When evidences of digitalis action are absent:* The procedure is the same as outlined above, except that the total amount of digitalis required is to be reduced to

75 per cent. of the total calculated. Thus, in the example used the total would be reduced to 17 c.c. instead of the calculated 22.5 c.c., and the fractions prescribed at each dose would be based on the former figure (17 c.c.). The usual one-tenth of the total every six hours may then be prescribed if necessary.

(*b.*) *When the evidences of partial digitalization are present:* It is best not to attempt to administer more than one-half of the total calculated amount of digitalis, divided equally between the first three doses. In urgent cases in this group, however, one may administer 75 per cent. of the calculated amount, preferably in three equal doses; and then, if digitalization is not quite complete, one-tenth of the total amount may be prescribed every six hours.

Safeguards: The appearance of one or more of the following criteria of adequate digitalization or of minor digitalis intoxication indicates the cessation of further admnistration, either permanently or temporarily.

1. Nausea or vomiting (except when due to splanchnic congestion and present before treatment is begun).
2. Fall of heart rate (not pulse rate) to or below 60 a minute.
3. The appearance of frequent premature contractions; of definite heart-block; of marked phasic arrhythmia, or of coupled rhythm.

When a leaf, tincture, or infusion, the cat unit of which is unknown, is employed, 100 mg. may be taken as the cat unit; but not more than 75 per cent. of the calculated total amount should be given in the first three doses.

When the patient can not be weighed or when marked edema or general anasarc is present, the body weight (exclusive of edema fluid) must be estimated as closely as possible and the total amount of digitalis calculated as usual. Not more than 75 per cent. of the calculated amount should then be given in the first three doses.

Administration of Digitalis. Harold E. B. Pardee[4] emphasizes that digitalization has come to mean the giving of digitalis to the point of saturation. On the aver-

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(4) New York Med. Jour., Dec. 27, 1919; also Jour. Amer. Med. Ass'n, Nov. 6, 1920.

age, a total dose of 2 minims of the tincture to each pound of body weight—300 minims then for a patient of 150 lbs.—will produce early toxic signs, but the susceptibility varies from half of this amount to over half as much again. Hence, we should never give the total calculated average dose to any patient at one time. On the other hand, if the average dose is insufficient to produce clinical improvement and has not caused the appearance of toxic signs, we must continue to give the drug, watching carefully for signs of early poisoning and not stopping the digitalis until they appear, for the average dose will not be sufficient if it is spread out over a period of many days, as the body is continually getting rid of some of the drug. The average rate at which the body disposes of digitalis has been found to be 22 minims of the tincture a day; but, here again, there are considerable variations. It may be as low a rate as 10 minims and as high as 40 minims daily. Susceptibility and ability to dispose of the drug are quite independent of each other.

Pardee[5] determined the rate of disappearance of digitalis from the body, by giving the drug so as to produce one of the mild toxic symptoms and then stopping entirely for a number of days. It was then given again until the same toxic sign reappeared. The amount of the drug used in the second course, divided by the number of days between the two toxic points, would give the daily average of the drug that had disappeared from the body in the interval, assuming that there is no change in the patient's tolerance for the drug, which proved to be a fair assumption.

Nausea and vomiting are the evident outstanding features in most cases of early poisoning. We should endeavor to stop the drug before even their appearance. There are two general types of abnormal findings which precede the stage of vomiting. Sometimes there will be disturbances of the rhythm of the heart, perhaps premature beats arising in the ventricles or auricles, or dropped beats due to heart-block; or, when auricular fibrillation is present, a very slow ventricular rate, fifty-five or even forty-five a minute. These disturbances of

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(5) Jour. Amer. Med. Ass'n., Dec. 13, 1919.

rhythm may be evident for from twelve to thirty-six hours before the appearance of vomiting. A thing, which may be more easily overlooked, is a curious mental depression that comes upon the patient, perhaps accompanied by a headache or perhaps by loss of appetite. If the patients are forewarned by the physician, they will readily recognize these symptoms when they appear. If either the disturbances of rhythm or the mental depression makes an appearance, no more of the digitalis should be given and no more need be given for a time at least, for we know that the patient is thoroughly digitalized.

The procedure recommended is to start with a large dose on the first day, perhaps a half of the calculated average dose, which will be one minim of the tincture to each pound of the patient's weight, and then to complete the course with smaller doses at four-hour intervals on the days following. If these smaller doses are each one-eighth of the remaining half of the calculated dose, they will vary from 12 to 25 minims, according to the weight of the patient, and if this dose is given every four hours, then the total calculated amount, the average effective dose, will be received within a period of three days at most. When the susceptibility of the patient is greater than the average, he may show the early toxic signs even as soon as the second day; when the susceptibility is less than average it may be necessary to continue the four hourly doses for one or two days longer before the signs of poisoning appear. For a patient weighing 120 pounds, this method of giving the drug would mean an initial dose of 120 minims of the tincture (2 drops to a minim), followed by doses of 15 minims every four hours; while, for a patient of 160 pounds, the initial dose would be 160 minims, followed by 20 minims every four hours. Should the patient not be under daily observation, it would be advisable to go more slowly as we approach the point of saturation. The four hourly doses which have been recommended should then be given only three times a day. The patient must not have taken any of the drug for a period of at least two weeks previous; for the total dose of digitalis probably does not disappear from the body for about three weeks. Having brought the patient to a condition of saturation with digitalis, which borders on poisoning, the drug should be stopped, and we should carefully observe the clinical aspect of the patient for a day or two in order to decide whether we have benefited his condition. If improvement has taken place, then it will do no harm to wait five or six days or more before resuming digitalis; and it is even possible that, in an occasional case, we may not need to use it again at all. Some patients will have been definitely improved by the first course; but after the drug has been stopped for several days, they become worse again. In patients showing uncertain improvement after a thorough digitalization, it is always advisable to continue the digitals on the fourth or fifth day after it was stopped. Whenever we decide to continue the drug we must take into account the nearness of the toxic stage; and if the number of days is small, we must use small doses. In such a case we must not give the drug much faster than the patient is disposing of it, the dose of 10 minims twice a day, beginning even as soon as three or four days after the drug has been stopped because of poisoning, will not bring any patient to the toxic stage again very quickly. If the period since the digitalization is long, it might be well to use the larger four hourly doses again for a day or so, in order to raise the patient's saturation to a more effective level.

A Readily Absorbed Digitalis Preparation. R. A. Hatcher[6] has shown and Cary Eggleston[1] has confirmed the observation, that by the simple process of extracting an infusion of digitalis with chloroform, and permitting the chloroform to evaporate spontaneously—no heat or chemical being used at any stage of the operation—it is possible to separate the digitalis principles into two groups one of which—the chloroform soluble—is rapidly absorbed, while the chloroform insoluble portion is very poorly absorbed in the human alimentary tract.

This observation, coupled with the fact that both portions produced typical digitalis effects on biologic assay, explains the variation in activity of biologically standardized tinctures of digitalis, which in some cases was

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(6) Jour. Amer. Med. Ass'n, Aug. 14, 1920.
(1) Ibid.

so great that from four to nine times the average therapeutic dose failed to produce any demonstrable effects. Evidently there is great variation in the relative proportions of the chloroform soluble and insoluble portions in tinctures of digitalis from various sources resulting in great difference in degree of absorbability.

The chloroform soluble substance is resinous in character, has a fragrant odor, and an intensely bitter taste. It is soluble in alcohol, and the alcoholic solution is miscible with water without great tendency to precipitation. The weakly alcoholic solution seems to be fairly stable. Hatcher believes that this substance consists chiefly of digitoxin. He thinks it is suitable for intravenous, and possibly for intramuscular, injection; though its ready absorbability on oral administration renders other modes of administration superfluous in nearly all cases.

[This work may result in an important improvement of our official digitalis preparations.—Ed.]

Strophanthin Intravenously. H. Roderburg[2] believes that intravenous injection of strophanthin ought to become a more common practice. He gives the following indications; acute, sub-acute, and chronic cardiac insufficiency of lesser grade. Excessively high blood-pressure is no contraindication. Strophanthin is unsuitable in the circulatory weakness occurring in infectious diseases. The initial dosage should not exceed 0.5 c.c. of 1:1000 solution; maximum doses of from 0.75 to 1.00 c.c. should not be administered oftener than once in twenty-four hours, generally 2-3-5 days. The author warns against injection outside of the vein as even minute quantities produce very disagreeable swelling of the arm.

Preparation of Strophanthin for Intravenous Injection. Robert L. Levy and Glenn E. Cullen[3] have found that many of the glass containers commonly used in the laboratory, and most of the glass ampoules employed in marketing sterile solutions, yield sufficient alkali on autoclaving, to change the reaction of distilled water from pH 6.0 to pH 9.0. By means of cat experiments and observations on optical rotation, it was shown that this increase in alkalinity is sufficient to render biologic-

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(2) Münch. med. Wochenschr., 1920, p. 152.
(3) Jour. Exp. Med., March, 1920.

ally inert and partially to decompose aqueous solutions of crystalline strophanthin.

It is advisable, therefore, to put up solutions of crystalline strophanthin in hard glass containers, such as ampoules of pyrex glass. In order to avoid even slight changes toward the alakline side, the drug may best be prepared in 0.02 M standard phosphate solution at pH 7.0. This concentration of phosphate is harmless when injected intravenously in small amounts (5 to 10 c.c.) into patients and does not interfere with either the chemical or physiologic properties of the glucocide. Crystalline strophanthin in such a solution, in 0.01 per cent. concentration (5 c.c. contain 0.5 mg.), sealed in ampoules, and autoclaved, has been preserved without evidence of reduction in biologic activity for more than five months.

The Digitalis-Like Action of Squill. Paul D. White, G. M. Balboni, and L. E. Viko[4] undertook a brief clinical study of the action of squill in fourteen patients with heart disease, complicated by auricular fibrillation in thirteen cases and by auricular flutter in one case. The two definite clinical signs of digitalis action, the production of heart-block and the lowering of the T wave of the electrocardiogram, were especially looked for. Heart-block was produced in this series by the standardized tincture of squill only in large dosage. The T wave of the electrocardiogram was flattened or inverted by large doses of the squill, as well. No diuresis occurred even with very large doses of the standardized tincture of squill, except in two cases of edema, after the pulse rate had been reducd and the circulation improved. Toxic symptoms were very rare even with the large doses. With the reduction in pulse rate (and diuresis) there was subjective improvement in some of the cases. The conclusion is justified that squill does have a definite digitalis-like action, but only in larger doses than now stated as an average, *e. g.*, from 8 to 16 c.c. instead of 1 c.c. of the tincture at each dose.

Epinephrine Sensitiveness in Patients with Hypertension. Paul W. Clough[5] finds a marked difference in

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(4) Jour. Amer. Med. Ass'n., Oct. 9, 1920.
(5) Bull. Johns Hopkins Hosp., August, 1920.

the cardiovascular reaction of different individuals to a subcutaneous injection of 1 c.c. of a 1 to 1000 "adrenalin" solution. As a rule, the blood-pressure showed little change during the first 5 minutes following the injection. There was then a fairly rapid rise in systolic pressure to a maximum, reached after from 10 to 20 minutes, and often associated with a simultaneous fall in diastolic pressure. There was then a more gradual fall in systolic pressure to the previous level or to a point somewhat below it, the latter being reached in from 45 to 90 minutes. The tachycardia and lowered diastolic pressure sometimes lasted considerably longer. In some cases in which absorption was presumably slower the reaction consumed about double this time. In other cases the rise began after 2 minutes, and the maximum was reached after from 5 to 10 minutes. This must be explained by more rapid absorption.

After intravenous injection (Fig. 18) the maximum systolic pressure was reached within from ½ to 1½ minutes; it fell rapidly after 2 or 3 minutes, and reached the previous level within 5 or 6 minutes.

The reactions observed have been classified arbitrarily, according to their intensity, as negative, moderate, marked and very marked. In a moderate reaction (Fig. 19) there was, (1) a rise of from 15 to 30 mm. in systolic blood-pressure; associated usually with (2) a fall of from 10 to 20 mm. in diastolic pressure; the striking feature of the reaction was (3) the increase in pulse pressure, which was often doubled; there was unusually (4) a slight tachycardia. Other symptoms were usually slight.

In marked reactions (Figs. 20 and 21) the systolic pressure rose from 30 to 100 mm. There was usually a slight rise in diastolic pressure also, and a marked rise in pulse pressure. There was sometimes glycosuria, and very often tachycardia, palpitation, pallor, mydriasis, tremor, nervousness, and anxiety.

Atropine, administered hypodermically in doses of from 0.6 to 0.8 mg. may cause a marked increase in the response to 1 mg. of epinephrine, given from 10 to 15 minutes later, or it may cause a sharp epinephrine reaction in a patient who did not react to epinephrine alone.

Atropine seems to exaggerate the cardiovascular response to epinephrine without changing its character.

In bringing about this cardiovascular response, epinephrine must act in two ways; first, by causing a vasoconstriction of the small arteries, and secondly, by directly stimulating the heart, causing not only acceleration of the rate, but also augmentation of the force of the beat,

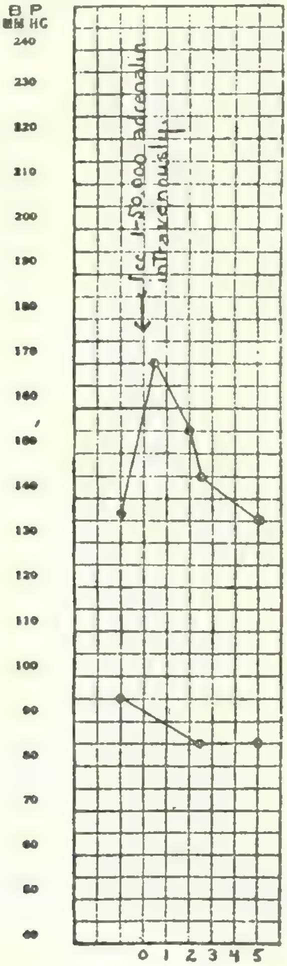

Fig. 18. Moderate response to the intravenous injection of epinephrine.

J. Q., white male, age 24.

Diagnosis: Acute nephritis; continued fever; tuberculosis of the spine. Slight renal insufficiency.

The dose was 1 c.c. of 1-50,000 dilution of epinephrine. There was a rise of 35 mm. in systolic pressure, reached about 30 seconds after the injection. The pressure fell practically to the initial level after 2½ minutes. The diastolic pressure was not accurately determined at the height of the reaction.

and increase in the volume output. This direct stimulation of the heart seems to be the more important factor in the reaction. It seems impossible to find any other

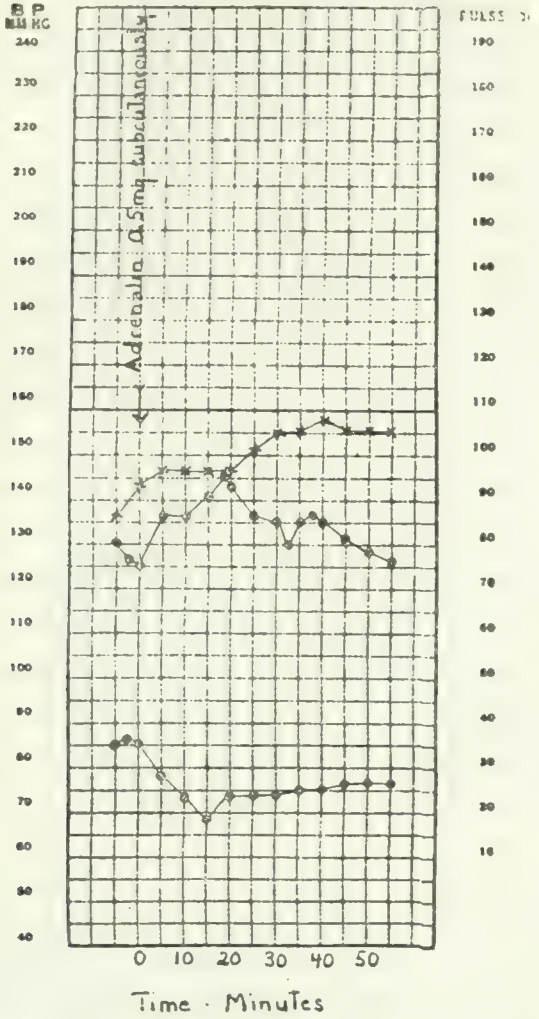

Fig. 19. Moderate reaction to epinephrine.
R. D., colored male, age 41.
Diagnosis: Myocardial insufficiency; chronic prostatitis.
There was a rise of 20 mm. in systolic pressure, associated with a fall of 18 mm. in diastolic pressure. The pulse pressure rose from 40 mm. to 75 mm., an increase of 87.5 per cent. of the initial pulse pressure. The pulse rate increased 20 beats a minute, but the maximum rate was reached after the systolic pressure had fallen nearly to the initial level. There were no subjective symptoms.

satisfactory explanation for the marked increase in pulse pressure, and particularly for the fall in diastolic pressure, so often associated with the increase in systolic pressure. Vasocontriction alone could not do this. This

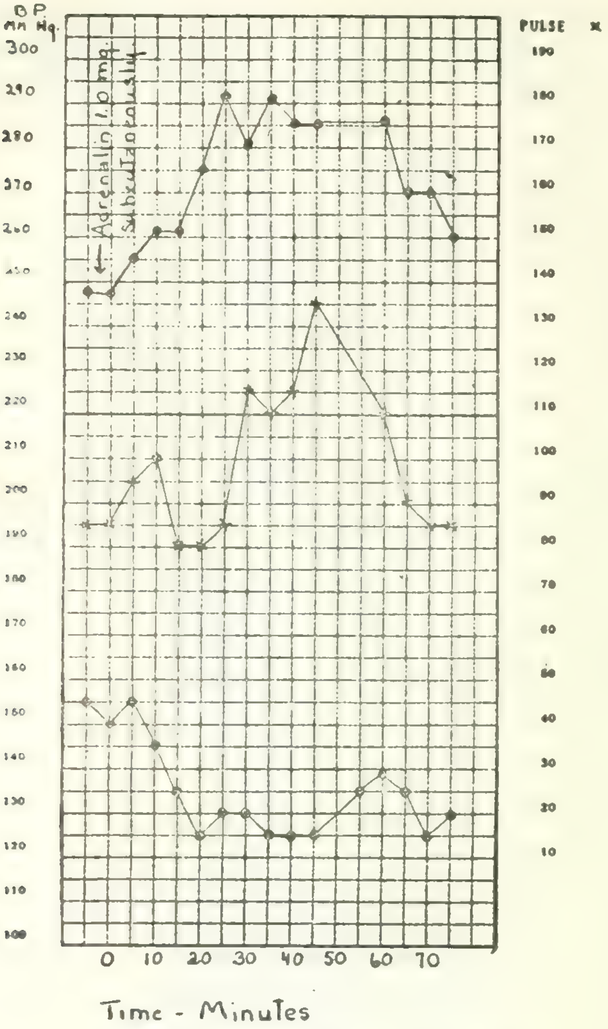

Fig. 20. Marked reaction to epinephrine.

E. N., colored male, age 58.

Diagnosis: Obesity, hypertension, myocardial insufficiency, chronic nephritis (?). No definite signs of hyperthyroidism.

On admission to the hospital the pulse was irregular in force and rhythm. Some beats were audible with a pressure of 310 mm. The patient was free from symptoms at the time the test was made.

The systolic pressure rose 45 mm., from 242 to 287 mm. The rise was more gradual than that shown in Fig. 21, the maximum being reached 30 minutes after the injection. The diastolic pressure fell 30 mm. The pulse pressure rose from 92 mm. to 167 mm., a rise of 75 mm., or 82 per cent. of the initial pressure. The pulse rate rose from 80 to 130, but the maximum systolic pressure was reached before the rise began. The subjective discomfort was very marked. There were rigor, sweating, polyuria, palpitation, extrasystoles, throbbing in the head, a "sick" feeling, mydriasis, and glycosuria of 5.5 g.

view is supported by the visible precordial heaving, and by the sense of palpitation complained of during the reaction, which may be out of all proportion to the degree of rise in the systolic pressure.

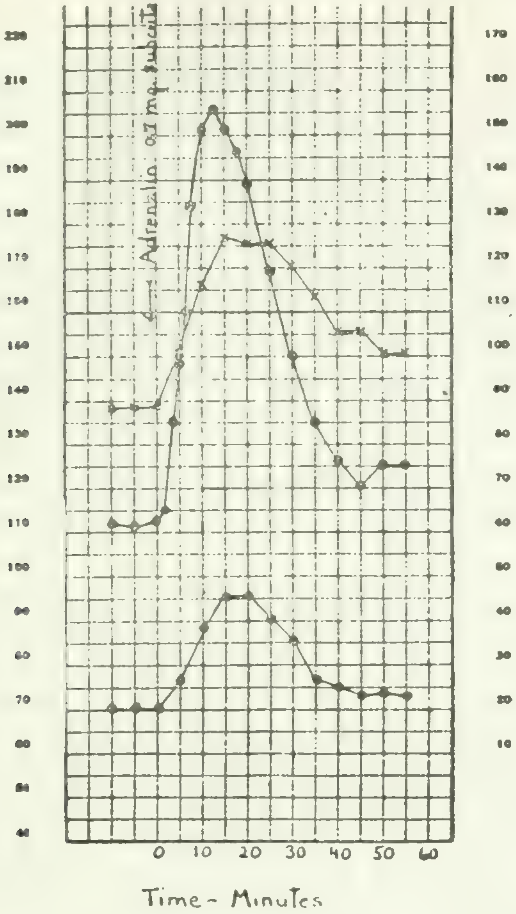

Fig. 21. Very marked reaction to epinephrine.

H. C., colored male, age 68.

Diagnosis: Syphilis (Wassermann reaction), arteriosclerosis, hypertension, myocardial insufficiency. No signs of thyroid intoxication.

The blood pressure on admission was $^{150}/_{100}$. At the time the test was carried out the symptoms of myocardial insufficiency were relieved, and the blood-pressure was normal.

The systolic pressure rose 95 mm., reaching the maximum 12 minutes after the injection. The diastolic pressure rose 25 mm. The pulse pressure was nearly trebled, rising from 42 mm. to 112 mm. The pulse rate rose 40 beats a minute. Pulsus alternans developed during the reaction. There were nervousness and palpitation of moderate degree. No glycosuria.

In the more severe reactions, vasoconstriction seems to play a more prominent rôle. Here diastolic pressure also tends to rise, and there is often visible pallor of the skin and mucous membranes, while a sense of coldness of the skin is complained of by patients.

Of thirty-two normal controls, 32 per cent. gave negative reactions, 30 per cent. moderate reactions, and 18 per cent. marked reactions. The most striking finding was the frequency of marked reactions in patients with hypertension (a systolic pressure of 155 or over). Of twenty-two cases tested, fifteen or 68 per cent. gave marked reactions to 1 mg. of epinephrine. In none of these fifteen cases were there any noteworthy "sympathicotonic" symptoms in the sense of Eppinger and Hess. This sensitiveness is shown more strikingly in the large percentage of very marked reactions observed, with a rise in systolic pressure of over 50 mm. Of the twenty-two cases of hypertension, eleven, or 50 per cent. gave such reactions, while of sixty-six other cases (excluding exophthalmic goiter) only two, or three per cent. so responded.

The available evidence (given in interesting detail in the original paper) does not support the conclusion that hypertension is due to, or associated with, a suprarenal hyperactivity, or a "hyperadrenalinemia."

Cardiac Action of Camphor. A. Fröhlich and L. Pollak[6] found that camphor is likely to be of value in cases of cardiac weakness in which there is lessened irritability, as in the cardiac weakness of anesthesia; while in cases of excessive irritability, as in paroxysmal tachycardia, camphor is contraindicated. They arrive at this conclusion of the favorable influence of camphor upon the damaged heart as a result of perfusion experiments of the isolated rat's heart, after it had been damaged by cooling, electric shocks, strophanthin, yohimbine, or chloroform. In these cases 1-10,000 of camphor will often produce an immediate improvement in the work of the heart. If the damage had progressed to a degree to interfere with the blood-supply through the coronary vessels, combination of camphor with caffeine, which is known to have the effect of dilating the coronary vessels, frequently produced improvement. This furnishes

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(6) Archiv. f. exp. Pathol. u. Pharm., 1920, p. 104.

the theoretical basis for the empirically established use of the caffeine-camphor combination. In the acute heart weakness of infectious diseases the authors could find no indication for camphor.

Multiple Injections of Camphorated Oil. These injections are advocated by S. Loewe(7) in order to increase the rapidity of its absorption and with it the degree of effectiveness. Instead of injecting a dose of 1.0, 2.0 or 5.0 c.c. of camphorated oil subcutaneously in one place, as many small injections possible of 0.5 or even 0.25 c.c. should be given in different places—ten or more, in the body. To lessen the necessity for multiple puncture, a long needle might be used and a dose of from 2.0 to 5.0 c.c. be deposited, in the manner of infiltration anesthesia from a single puncture in many minute portions and in various directions.

Camphor Useless in Pneumonia. F. F. Gundrum(8) studied the clinical value of camphor by giving each patient injections of 15 c.c. of a 20 per cent. solution of camphor in olive oil twice daily. The least troublesome site proved to be the abdominal wall. The effects on the circulation were determined by taking a record of the pulse and of the systolic and of the diastolic blood pressures just before injection and again after intervals of fifteen minutes, one hour, and two hours. The changes found were inconsequential and might easily arise in the course of the disease uninfluenced by drugs. That mortality, duration, or complications of the disease were not influenced favorably, even though the average number of injections was five and the amount of camphor 210 grains, is shown by a mortality of 29 per cent., approximately the normal rate for the hospital. Duration averaged 6.2 days, slightly longer than the total average of 5.7 days for all cases. Complications and sequeles showed the usual array. Hence, critical study of the effects of camphor shows the results to be practically *nil.*

Cardiac Action of Quinine. C. Pezzi and A. Clere(9) consider quinine in the form of bromide, valerianate, or basic chloride useful in extrasystoles, paroxysmal tachycardia, and in auricular fibrillation, and suggest that it might be of prophylactic value against heart failure in chloroform narcosis. They administer from 1 to 1.5 gm. daily in two or three doses, after tolerance has been determined by preliminary administration of 0.5 gm. a day. They consider intravenous injection dangerous.

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(7) Therap. Halbmonatsh., April 15, 1920.
(8) Calif. State Jour. Med., September, 1919.
(9) Presse méd., May 26, 1920.

[This recommendation is perhaps in line with the use of quinine hydrobromide in the tachycardia of exophthalmic goiter.—Ed.]

MISCELLANEOUS

Aconite in High Blood-Pressure Cases. Frank T. Hartman[1] has found aconite the drug of most value, in his practice, in relieving the symptoms in cases of high blood-pressure. He prescribes tincture of aconite of the U. S. Pharmacopeia, of 1890 [which was 35 per cent. in strength, while the present tincture is 10 per cent.—Ed.] in 10-drop doses four times a day. [Equivalent dosage of the now official tincture may and should be used.—Ed.] In many cases added relief is secured by giving the iodides in 0.30 gm. doses. While aconite does not cause any great lowering of blood-pressure in mm. Hg., it gives these patients the needed relief through its effect on the blood-vessels and kidneys.

The Therapeutics of Aspidosperma. R. W. Wilcox[2] notes that the special effect of this drug is upon respiration; by small doses an increase in depth, and by larger doses an increase in both rate and depth, of respiration is caused. The volume of air moved may be quadrupled. This condition is due to some action upon the respiratory center. The expectorant effects are not entirely due to the nauseating action of the Galenical preparation. It increases bronchial secretion and lessens the disposition to cough. It must be borne in mind that this drug depresses the circulation. There is a temporary fall of blood-pressure which may persist if the dose is large, and which probably is the result of a depressive effect upon the cardiac motor ganglia or on the muscle.

Aspidosperma is especially valuable for the relief of

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(1) Illinois Med. Jour., July, 1920.
(2) Med. Record, Oct. 25, 1919.

dyspnea, not due to serious organic disease. It may relieve symptomatic asthma when due to uremic conditions, and possibly when arising from cardiac failure. However, when the dyspnea is due to cardiac hypertrophy, relief is more certain because of the depressant effect of the remedy upon the cardiac musculature. The asthmatic symptoms of secondary anemia are often markedly relieved. After its administration there is usually a feeling of warmth in the head, some perspiration, and frequently slight salivation. The dose required for this purpose is from ½ to 1 teaspoonful (2 to 4 c.c.) every two to four hours; but, if long continued, it is likely to cause nausea. Aspidospermine represents fairly well the activity of the drug with the advantage that it may be used hypodermically in doses of 0.03 gm. Wilcox has often obtained brilliant results from the administration of aspidosperma and occasionally equally inexplicable failures.

Eserine in the Treatment of Sympatheticotonia. L. Cheinisse[3] reports favorable results obtained by Moutier and others with eserine in the treatment of sympatheticotonia. Sympatheticotonias are hypersensitive to adrenaline. While in vagotonia, the patient reacts strongly to pilocarpine and atropine. Clinically, vagotoniacs are pale, with cold and cyanotic hands, bradycardia, irregular heart, extrasystoles, gastric hypersecretion, hyperchlorhydria, constipation, hypertension and miosis; whereas sympatheticotonias present tachycardia, vasomotor disturbances with feeling of heat, gastric atony with dilatation, hypertension, epigastric hyperesthesia and mydriasis. Moutier gave the name *"crise solaire"* to attacks of arterial and epigastric pulsation and tachycardia. Having failed to obtain satisfactory results from the usual antispasmodics, he employed eserine, and found it successful. By mouth he gives it in the following formula:

Eserine salicylate*	0.01	gm.
Glycerine	3.5	c.c.
Distilled water	1.5	c.c.
Alcohol, to make	10.0	c.c.

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(3) Presse méd., July 10, 1920.

* The unstable sulphate and hydrochloride of eserine should not be employed.

He commences with 10 drops three times a day before meals, and gradually increases to 60 drops, if required. With the exception of slight vertigo, no intoxication has been noted, not even in a patient sensitive to two or three drops of tincture of digitalis. A. Mougeot found it successful in cases of essential tachycardia in which the pulse became less rapid after the hypodermic injection of 2 mg. eserine salicylate. Kaufmann found it useful in an aged woman who had been operated on for gall-stones and ileus associated with meteorism, tachycardia and low blood-pressure. Digitalis had been given with no promising result. After he injected hypodermically 3 mg. of eserine, the pulse became normal. In another similar case, Kaufmann succeeded by giving eserine with digitalis, to bring the pulse from 130 down to 80 the day following the injection and to 50 after another dose. Given with strophanthus it has cut down the number of attacks in three cases of paroxysmal tachycardia and even caused them to disappear. The results are unsatisfactory in cases of permanent arryhthmia, although Kaufmann obtained a prompter and greater slowing of the pulse in some of these cases than when digitalis was used.

Eserine is contraindicated in organic lesions of the abdominal viscera and in pain caused by spasm. Here atropine is the treatment of choice.

Potassium Boro-Tartrate in Epilepsy. Among the borates employed, Marie, Crouzon, and Bouttier[4] found the double salt, boro-tartrate, the most efficient in the treatment of epilepsy. Its chemical formula is $CO_2H—CHOH—CHO(BoO)—CO_2K$. They administer it by means of the following formula, in which the glycerine is not essential:

Potassium boro-tartrate	20,00
Glycerine.	10,00
Water to make	300,00

Mix. Label: tablespoonful 3 times a day after meals.

Patients thus get about 30 grams in 24 hours.

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(4) Presse méd., Oct. 9, 1920.

The authors discuss in detail the result of experimentation on two series of patients in whom they noticed that all of the epileptic symptoms, fits, vertigo, etc., were markedly diminished. In some cases, the epileptic manifestations were reduced to one-third within three months of treatment; and these results were maintained for eight months, while in other cases the fits were replaced by vertigo. At the same time, the general condition of the patients improved. With much enthusiasm a case is cited, in which the fits entirely disappeared. The double salt was effective when bromides and other borates failed.

When symptoms of intolerance appear they suspend the treatment for a few days, to resume it as soon as the symptoms disappear. As a whole, it is well tolerated. Similarily good results are obtained in children. They noticed no psychic depression. On the contrary, the patients became gay and happy; and, in some cases, the memory is improved and they were less "nervous." They cite the case of a woman of 50 years who had epilepsy for 32 years and was mentally dull and expressionless. Under this treatment she ceased to have fits, became mentally active and her psychic state improved. There was such a marked change that she was not recognized by her friends. A case of Jacksonian epilepsy responded, but not so well as the other cases. They found the preparation a substitute for bromides and borates when, although the patients were doing well under the latter medicaments, they for some reason rebel against their use. In some cases, they found it of advantage to alternate bromides with potassium-boro-tartrate; but, when one drug is discontinued, it is necessary to give the other one immediately, for the double salt is not retained long in the body after its suspension. The addition of luminal to potassium-boro-tartrate will often help to cause disappearance of vertigo and fits. Sometimes, however, the addition of luminal aggravates the condition. So far, this preparation seems to the authors, the treatment of choice in epilepsy.

The Diuretic Action of Potassium Chloride. L. Blum[1] writes of his 10 years' research to determine the mechanism of the formation of edema in diabetics who are under the influence of sodium bicarbonate and also the cause of retention of water in other pathologic conditions, especially nephritis. Among the several hypotheses that can explain the mechanism of the production of edema by sodium bicarbonate, the author favors the theory that the Na ion of the alkaline salt combines with the chlorides in the tissues to form sodium chloride, and that sodium bicarbonate has an inhibitory action on the kidney, preventing the excretion of chlorides, because with its administration there is a decreased excretion of chlorides in the urine. Further evidence is that the urine is alkaline 24 to 48 hours after the discontinuance of the drug. As little as 30-40 gm. is sufficient to produce edema in the sick, while in the normal from 100-140 gm. in 24 hours failed to produce this result. From 15-20 gm. were sufficient in Bright's disease and arteriosclerosis. When potassium bicarbonate is substituted in place of sodium bicarbonate, and potassium chloride is given in addition, the kidneys become more permeable to chlorides, for there is an increased elimination of these in the urine.

Blum discusses in detail the case of a young woman of 23 years with severe Bright's disease with edema, in whom there was no notable result after the administration of the classical diuretics; but in whom, after the administration of 10-12 gm. of potassium chloride the first 24 hours and 25 gm. in three doses the following day, there was a marked loss in weight and a small excess of chlorides excreted in the urine, which soon stopped after the potassium chloride was discontinued; the weight again increased only to diminish again after the KCl was renewed. The patient had no appreciable by-effects except a slowing of the pulse. The albuminuria diminished in amount, and no unfavorable action resulted on the urinary sediment.

Blum also found KCl an efficient diuretic in certain cases of kidney disease with dropsy when other diuretics failed. In moderate doses, it may supplant the action

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(1) Presse méd., Sept. 29, 1920.

of other diuretics in edema due to other pathological causes. The salt, however, is far from being harmless. With unstable heart and high blood-pressure it may induce serious and alarming symptoms, as well as colic, weakness, and chilliness. In certain patients various untoward effects are produced, even with doses as small as 10 gm. a day. Hence, he gives the salt in small quantities, 1-2 gm. at first and then increases carefully till their tolerance is proved. A good way to administer it is to give 0.5 gm. per 100 gm. of vegetables; thus from 3-4 gm. can be given at noon and evening meals.

Colchicum in Gout. S. Loewe[2] endeavors to explain the mechanism of the effect of colchicum in gout by its tendency to act as a capillary poison; that is, as an agent capable of producing high-grade capillary hyperemia most especially of the gastro-intestinal mucous membrane. Arsenic and ipecac are poisons having a similar effect on the alimentary tract. Loewe believes that the special efficiency of colchicum is due to its effect upon other capillary territories as well, particularly those of the joints. He refers to observations, most especially those of Hugo Schulz, on healthy persons in whom colchicum produced joint and muscle pains. Hence, colchicum does not act merely by its drastic effect on the bowel, although pushing the dose up to the appearance of diarrhea is an indication that the fullest permissable dose is reached.

He recommends that colchicine be employed, as for instance, according to the following prescription:

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Colchicine	0.030 gm.
Extract of glycyrrhiza	1.500 gm.

Divide into thirty pills, and dispense in amber vial.

The dosage of 1 mg. is a rather large one. This, however, is usually tolerated from two to four times daily for a few days. It may be advisable to order that four be taken on the first day, three on the second day and two on the third day. Still better, though somewhat more expensive, are tablets or granules containing from 0.5

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(2) Therap. Halbmonatsh., Jan. 1, 1920.

to 0.1 mg. of colchicine, which, when kept dark and dry, are more stable than the pills prescribed.

Cholagogue Action of Peppermint Oil. Heinz[3] finds, as a result of animal experiments with volatile oils, that some of them, but most especially oil of peppermint, have a marked influence in increasing biliary secretion. In animals to which oil of peppermint is given orally, subcutaneously, or intravenously, the gall-bladder is dilated and tensely distended with clear, beautifully green fluid, bile, free from sediment. The increase in bile content has been estimated to be from four to eight times. That this is not due to impediment to the escape of bile, is shown by the fact that the jejunum contents are found to be remarkably green in color. The oil produces neither dissolution of red corpuscles nor damage to the liver. It seems to be the first specifically acting cholagogue known. After larger doses, the bile has a distinct odor of oil of peppermint. Lecithin stones exposed to such bile are definitely softened.

On the basis of these observations, Heinz recommends oil of peppermint in the treatment of cholethisiasis. He has had sugar-coated tablets prepared, each of which contains 0.0125 gm. of oil of peppermint, which the patient is to swallow without chewing. During an attack he advises the use of four tablets three times a day; during intervals, periodic consumption of six tablets daily.

He also gives the following prescription:

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Oil of peppermint	0.5 gm.
Sugar of milk	10.0 gm.

Divide into 40 lozenges.
Label: Three times daily 2 to 4 lozenges.

[Encapsulation of the powder instead of prescribing troches would be more suitable to the facilities of the average druggist, and the requirements of the medicament, which in these doses has an unpleasantly strong odor and taste.—Ed.]

Action of Emmenagogue Oils on Human Uterus. J. W. C. Gunn[4] recorded the movements of the human

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(3) Therap. Halbmonatsh., July 1, 1920.
(4) Jour. Pharmacol. and Exp. Therap., Jan., 1921, p. 485.

uterus and Fallopian tubes by Kehrer's method, suspending strips of the tissue in oxygenated bath of Ringer's solution at body temperature. The material was obtained from two cases in which hysterectomy was performed for uterine disease. The effect of the following drugs was tried: oil of juniper, pennyroyal, rue, savin and tansy. No stimulant action on the human uterus and Fallopian tubes was obtained from any of these "emmenagogue oils." In large doses they cause relaxation and inhibition of movement. When abortion occurs after their use, it is probably an indirect result of severe irritation of the bowel and kidney.

Administration of Hypophysis. Benjamin P. Watson[5] uses pituitary extract extensively for the induction of labor and during all stages of labor to accelerate delivery—and never with bad results—by beginning with a dose of from 0.5 to 1 c.c., administered intramuscularly, with a long needle. In most cases uterine contractions commence in about ten minutes, and increase in severity during the next twenty minutes. At the end of this time a second injection of 0.5 c.c. is given. If, after a time, the contractions tend to weaken or to come at longer intervals, the dose is repeated. As many as six or eight doses may thus be given with perfect safety at intervals of about half an hour. The important point is to administer a further dose before the effects of the previous one have passed off. There is no danger from cumulative effect. When the cervix has begun to open and the membranes to bulge into it, the uterine contractions will continue without further administration of the drug.

Histamine Probably not Active Principle of Hypophysis. As was reported in last year's volume of this series,[6] J. J. Abel and Seiko Kubota, believe they have demonstrated that the active principle of hypophysis is identical with histamine. This conclusion is disputed by Douglas Cow[7] on the strength of the observation that the uterus of the mouse responds to histamine by relaxation, while pituitary extract produces increase in

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(5) Trans. Amer. Gynec. Soc.; abstracted in Jour. Amer. Med. Ass'n, July 3, 1920.
(6) Practical Medicine Series, 1919, Vol. VI, p. 170.
(7) Jour. Pharm. and Exp. Therap., November, 1919.

tonus. This observation is shown to be erroneous by J. J. Abel and D. I. Macht,[8] who point out that the concentration of histamine, used by Cow, was excessive; that solutions of histamine stronger than 1:100,000 cause relaxation, while 1:500,000 or 1:1,200,000 causes most vigorous contraction of the uterus of the mouse. They also showed that a very concentrated solution of pituitary extract has a paralyzing action upon this organ.

However, observations disputing the theory of histamine as the active principle of the hypophysis, to which Abel and his collaborators have not yet replied, are brought forward by H. W. Dudley[9] who claims that the following differences are displayed:

Pituitary Uterine Stimulant	*Histamine*
Readily extractable from acid (HCl) solution by butyl alcohol at reduced pressure	Only very slowly extracted from acid (HCl) solution by butyl alcohol at reduced pressure.
Rapidly destroyed by normal sodium at room temperature	Unaffected by normal sodium hydroxide at room temperature.
Rapidly destroyed by trypsin	Unacted on by trypsin.
Insoluble in boiling chloroform	Soluble in boiling chloroform.

The only point of similarity so far as solvents are concerned, is that both are readily extracted from alkaline solution by butyl alcohol.

Violets as Purgative. A. Garrigues[1] states that, although the various species of viola have allied properties, they are not identical. All are capable of exerting hydrogogue cathartic and emetic action. *Viola arvensis* has been found to contain a powerfully acting, possibly alkaloidal body, "violine," which possesses properties similar to those of apomorphine and of emetine. A dose of 2 gm. of the root of *Viola tricolor* is emetic. For *viola odorata,* the dose is from 7 to 11 gm., in form of a decoction. The leaves and the flowers are also purgative. When fresh, they are much more active and may simply be eaten as a salad, or infused with oil, vinegar or water. Heat causes them to lose some of their medical proper-

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(8) Jour. Pharm. and Exp. Therap., November, 1919.
(9) Ibid., December, 1919.
(1) Presse méd., Sept. 18, 1919.

ties. The author urges a revival of the study of the pharmacologic, and therapeutic properties of the gender viola, first of all, to differentiate the various species, then to determine the best mode of action, and to fix the dose, for he believes the violet and the pansy might possibly furnish us not only with a good purgative, but even with a valuable remedy against certain forms of habitual constipation.

TOXICOLOGY

Poisoning by Alcohol "Denatured" with Nitrobenzene. R. W. Scott, and P. J. Hanzlik[2] had occasion to examine a number of dark, ghastly looking patients who had been drinking "denatured alcohol" brought into the city hospital, as a rule, unconscious. The dark, almost black, discoloration was limited mainly to the extremities, face and neck including a fringe of the upper portion of the chest. After a deep sleep of about twenty-four hours all the patients left the hospital fully recovered.

The results of examination indicate that the peculiar discoloration in these patients was due to methemoglobinemia arising from the ingestion of nitrobenzene in the "denatured" alcohol. As recovery from nitrobenzene poisoning is prompt and spontaneous, this "denaturizing" agent is perhaps relatively harmless; but there is considerable potential harm from such beverages when used over long periods, and confusion with minor maladies might easily arise.

Acute Methyl Alcohol Poisoning. Raphael Isaacs[3] reports that, in the extreme cases of this condition, the patients are brought in in a comatose condition, usually with cyanosis which sometimes is very intense. The methyl alcohol appears to act as a respiratory poison, the rate of breathing in severe cases being reduced to six or fewer times a minute and quite shallow. The breath usually has the odor of methyl alcohol. The temperature is subnormal at times, but usually reaches 99° F. some time during the first twenty-four hours. During the acute stages, the pulse is accelerated, reach-

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(2) Jour. Amer. Med. Ass'n., April 10, 1920.
(3) Ibid., Sept. 11, 1920.

ing 100 and over (120). A characteristic feature is dilatation of the pupils, which however may react somewhat to strong light. With return of full consciousness, the patients usually complain of blurring of vision, noted in from one to twelve hours. The conjunctiva may be congested. Headache is usually experienced, being quite constant on the following day, with sometimes a feeling of numbness in the head. Vertigo is frequently present. Nausea is usually present, and vomiting frequent.

The mode of action of the toxic agent is still problematic. The theory most in vogue is that the toxicity is due to the formation of formic acid, from incomplete oxidation of methyl alcohol, the resulting ''acidosis'' being the cause of the syndrome. The symptoms seem to group themselves into a paralysis or depression of the medulla and the cranial autonomic system, sometimes the sacral, with an additional selective action on the optic and possibly other nerves.

The plan of treatment is based on alkalinization and elimination. If the patient is not comatose, and is received within twelve hours after taking the wood alcohol, it is well to pass a stomach tube and wash out the contents with a 1 or 2 per cent. solution of sodium bicarbonate in warm water, as experience has shown that some of the alcohol is excreted into the stomach. Three or four ounces of a 50 per cent. solution of magnesium sulphate are then poured in through the tube and left in the stomach. Sometimes an hour or more after washing, the patient will vomit a considerable amount of food debris having a marked odor of methyl alcohol. The patient is put to bed, kept warm if his temperature is low, and is given 3 gm. of sodium bicarbonate, with about 250 c.c. of water every two hours, for about six doses, being wakened for his medication if asleep. Sometimes a whiff or two of aromatic spirits of ammonia will serve to awaken the patient long enough to make him swallow. The dose of bicarbonate may be doubled without apparent ill effects. After this the patient is given 3 gm. of sodium bicarbonate with a glass of water, three times a day, one hour before meals, until the symptoms have disappeared. A safe guide as to the dose is to keep the fresh urine alkaline to methyl red. Fluids are forced, and a liquid diet is given until the acute symptoms are over.

If the patient is comatose, or if the cyanosis is very marked, with respiration much depressed, it is well not to wash out the stomach at first. In this case, or if medication by mouth is not retained, 1,000 c.c. of Fischer's solution (sodium carbonate, 0.37 per cent. sodium chloride 1.4 per cent.) at 99° F. is given slowly intravenously. *In case of any doubt it is well to give the intravenous injection.* If there seems to be congestion of the venous circulation from embarrassment of the right side of the heart, it may be well to draw off from 100 to 300 c.c. of blood before giving the intravenous injection. A spinal puncture may be made if there is much restlessness and if there are signs of cerebral compression. After Fischer's solution, there appears to be a dehydration of the nervous tissue, with increase in spinal fluid. The breathing usually improves rapidly, the mental state clears, and in from six to twelve hours the cyanosis has virtually disappeared. There is rapid improvement in the eye signs, the blurring of vision disappearing in from twelve to twenty-four hours, or sometimes a slightly longer period. The abdominal tenderness soon disappears.

The author reports two fatal cases that did not receive alkalization, and six cases treated by alkalization which ended in recovery with no impairment of vision. The average stay in the hospital was about five days, with treatment for two or three days.

Alkali in Methyl Alcohol Poisoning. Chas. C. Haskell, S. P. Hileman and W. R. Gardner,[4] having found that the administration of methyl alcohol to dogs in dose of 8 c.c. per kilogram given subcutaneously or orally was fatal, and that acidosis was present, as shown by reduction in the combining power of the blood plasma for CO_2, attempted treatment by alkali in three different ways: orally, by rapid intravenous injection and by slow intravenous injection. They employed a 5 per cent. solution of baking soda in distilled water, boiled for a few minutes, allowed it to cool,

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(4) Archiv. Int. Med., January, 1921.

after which CO_2 was passed through it for about 30 minutes. Oral administration proved worthless. Rapid intravenous injection caused death almost immediately after introduction of the solution, showing that such treatment is dangerous. The best results were obtained from slow intravenous injection of 25 c.c. of solution per kilogram given in 20 to 90 minutes. Nevertheless even here the results were decidedly not encouraging.

Wood Alcohol Poisoning. Four cases of this condition caused by drinking bay rum, three of which were fatal, are reported by N. S. Betts.[5] None of the labels on bottles seen by the writer made any note of the alcoholic content, or of the fact that they were poisonous if taken internally. The prohibition of the sale of alcoholic drinks and the present high cost of distilled spirits, makes the danger from poisonous substitutes a very real one and worthy of widest publicity and of careful study.

Symptoms: All the patients had vomiting and epigastric distress, intense nervousness, soft, rapid, but regular pulse, and, where the man was conscious, complaint of dimness of vision and pains in various parts of the body. This stage may last for from twenty-four to forty-eight hours. When coma supervened, the end came very quickly, in from one-half to four hours. The patient who recovered applied for help within 11 hours after drinking three pints of bay rum. The case was treated like one of acidosis, *i. e.* by enteroclysis and alkalies and diuretics by mouth.

A simple test for methyl alcohol is described in the article.

Chronic Aniline Poisoning. W. Gilman Thompson[6] reports a case of this kind in a woman, from the use of a hair dye called "*goute à goute*" (drop by drop) because, in mixing it for application, additional drops are used to obtain the dark shades, up to almost jet black. The type of aniline was paraphenophendiamine 2 per cent. with hydrogen peroxide 75 per cent. and alcohol 23 per cent.

The patient's symptoms of poisoning lasted for more than two years, during which time she was troubled by

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(5) U. S. Naval Med. Bull., October, 1919.
(6) Med. Record, March 6, 1920.

a dermatitis which first appeared at the margin of the scalp, parts of the face, neck, and shoulders. The rash continued and extended, amounting to exfoliative dermatitis. A course of baths ''nearly finished her'' as, after the baths, the dermatitis became universal. About this time she had frequent fainting attacks. She noticed blurring of vision in reading, and had several severe attacks of vomiting, one of which lasted a full week.

The symptoms of chronic aniline poisoning fall under five groups as follows: (1) Cutaneous, mainly intense diffuse dermatitis, becoming exfoliative and very painful, with intolerable burning and itching—water greatly intensifies the irritation of the poison, in part by spreading it over the surface; (2) gastrointestinal, with nausea, persistent attacks of severe vomiting, independent of the ingestion of food, and diarrhea; (3) nervous and muscular, with vertigo, insomnia, weakness of the legs and a staggering gait; (4) vascular, with a rapid feeble pulse, low blood-pressure, cold extremities and cyanosis; (5) ocular, with dimness of vision and diplopia. As the patient had nearly all the typical symptoms of this sort of poisoning, Thompson was led to suspect the use of hair dye, and finally succeeded in obtaining from the patient the confession of such use. Discontinuance of the dye led to rapid improvement.

The menace of aniline hair dyes has not yet sufficiently been emphasized. It is well to be suspicious of artificial Titian red and all the darker shades up to jet black.

Acute Bismuth Subnitrate Poisoning. C. D. Constantinescu and A. Jonescu[7] report a case of poisoning from three teaspoonfuls of bismuth subnitrate given in a glassful of milk for roentgenoscopic examination of the stomach for supposed gastric ulcer. Nine hours later, the patient took a dose of magnesium sulphate. The chemical examination of the blood showed the presence of nitrites, but no trace of bismuth. Spectroscopic examination of the blood showed an intermediate band between the D and E which became more intense by the addition of ammonium sulphate, a fact which is opposed to the classic theory that nitrites give rise to the formation of methemoglobin. The magnesium sulphate that

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(7) Presse méd., Feb. 25, 1920.

was given to the patient after the bismuth subnitrate gave rise to the formation of nitrites, which were absorbed, but the symptoms were due to the transformation of oxyhemoglobin into reduced hemoglobin and into an oxynitrohemoglobin. Poisoning due to other nitrites such as amyl nitrite, sodium nitrite, etc., may also be due to, and detected by, the presence of this oxynitrohemoglobin, which may be the key to those blood intoxications observed, in which methemoglobin is absent.

Lysol Necrosis. Horace K. Sowles[8] reports a case of necrosis of a finger analagous to "carbolic-acid gangrene," which followed soaking the finger in lysol solution four times, perhaps fifteen or twenty minutes each time. The patient took a basin of water and poured in an indefinite amount of lysol. Then the hand was placed in the solution, palm upward, the dorsum of the index finger apparently lying in the concentrated lysol which had settled to the bottom of the basin and had not been mixed with the water. Use of 1 to 2 per cent. solution, well mixed, would probably have been safe.

Narcotic Drug Addiction. S. Dana Hubbard[9] expresses his opinion of the treatment as follows: "There is no specific cure; none is needed. Take away the drug, and prevent the addict from getting a new supply; and not only will he be cured, but he will stay cured."

"In the vast majority of instances—99 per cent.—excellent results may be obtained by simple abrupt withdrawal, without medication other than catharsis. Some form of mild anesthetic to tide over the first two or three days of suffering, which is mainly psychic in origin, is desirable from a humane point of view. Scopolamine (hyoscine) is ordinarily used for that purpose, but it is stated that belladonna works equally as well."

Narcotic drug addiction can be stopped by sufficiently stringent laws, strictly and uniformly enforced.

Sodium Chloride as Antidote for Strychnine. Giovanni Giribaldi[10] tested the claims of Lesné and Richet (1901), Simon (1910), and Nobecourt (1904), that so-

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(8) Boston Med. and Surg. Journ., Oct. 23, 1919.
(9) Jour. Amer. Med. Ass'n., May 22, 1920.
(10) Gaz. d. Osp., Dec. 11, 1919.

dium chloride renders certain poisons, among them strychnine, less fatal. He performed experiments on rabbits and on dogs which demonstrate that a strong solution of salt has a certain antidotal value. However, for any effect to be apparent, the sodium chloride must follow the strychnine in less than five minutes either by the mouth, when it acts chiefly as an emetic, or subcutaneously in concentrated solution (5 N or 29.25 per cent. solution), which gave best results. In strychnine poisoning, when all other antidotes are lacking, a concentrated solution of sodium chloride, rapidly prepared and promptly injected subcutaneously, may be of help not only by suppressing the toxic effects, but in the less favorable cases by prolonging life, thus permitting time for the use of chloral or chloroform and of tannic acid. It may be called a "first-aid antidote."

NON-PHARMACAL THERAPEUTICS

PSYCHOTHERAPY

Psychotherapy of "Nerve Tire." Percy G. Stiles[1] differentiates between ordinary fatigue and nervous fatigue. Ordinary fatigue is diminished capacity to respond to stimulation, an elevation of threshold which is of protective value. Such resistance appears to be developed at the junctions between nerve and muscle when they are repeatedly traversed. It is doubtful if mental fatigue is of this nature. What we call fatigue in connection with the steady performance of some monotonous mental operation is the tendency to seek relief in novelty —to admit new and irrelevant ideas.

What is commonly called nervous fatigue is composed of two factors: The first of these is the loss of inhibition, a late acquisition, a relatively insecure possession, lost as a result of many forms of wear and tear. A nervous system that has suffered this loss is said to be fatigued though it shows many signs of over-activity. It does not regularly incline to rest when rest is needed. There is hypersensitiveness. But there is still another element in nervous fatigue dependent upon the nerve

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(1) Amer. Jour. Pub. Health, August, 1920.

tissue's property of *canalization,* which means diminished resistance in frequently traversed paths. When a path is pursued by nerve-currents until its synapses develop resistance to the continued transmission, the common type of central fatigue is manifested. But such fatigue is transient; and, when it has passed, the net result is a greater facility for conduction in the path that has been traversed. This adaptive quality is the basis of accomplishments of every kind, as well as of mannerisms and unfortunate habits. Canalization in the associate systems must be at the root of scholarly attainment; it is the condition of manual skill. The canalization capacity which tends to make "ruts" in the brain is discovered not only in conduct but in unhappy trains of thought, *e. g.,* incessant anxiety and self-pity. The most injurious canalizations have the character of closed circuits in which every discharge reacts upon the cells originally concerned and compels them to renew their activity. The circular flow of nerve impulses needs to be diverted to some channel of expression, that it may no longer return persistently to its own source.

When an emotional element enters, the fatigue is accompanied by involvement of glands of internal secretion, notably the adrenal and probably the thyroid. When these have been exercised, depression is to be expected. The glands may be exhausted so that for a time the delivery of their products is subnormal. [Or else, as a result of excessive demand, over-activity of these glands may result.—Ed.]

Change of scene and sanitarium life may be chiefly useful by favoring the disruption of the nerve-paths excessively employed. Psychotherapy may effect this, either by the abstract terms of some idealistic system or the very same jostling from the grooves may be accomplished by a measure of harshness. The more insight one gains into the workings of the nervous apparatus the less one is surprised by the comparatively rapid adjustments which may often be accomplished in it. Recovery from nervous fatigue is less a matter of correcting the metabolism than of desirable habit formation.

Psychotherapy in Treatment of Functional Nervous Disorders. The point chiefly emphasized by Bernard

Hart[2] is that, inasmuch as morbid ideas are the essential cause of psychoneuroses including hysteria and neurasthenia, psychotherapy constitutes the essential feature of treatment. Though physical causes may coöperate in producing a psychoneurosis, the part played by psychic causes is so essential that, if the latter can be removed or modified, the psychoneurosis itself will be removed or modified. The broad underlying principle to be grasped in these cases is the recognition of the fact that the patient has failed to adapt himself adequately to a particular situation, and that the psychoneurosis has arisen because the psychologic factors in that situation have been wrongly adjusted. In the light of this principle, the futility of rest cures and voyages is immediately apparent, for the patient's troubles are in his mind, and he takes them with him wherever he may be sent. A rest cure may be an excellent adjuvant, a voyage valuable in convalescence; but, unless the factors responsible for the disorder are properly dealt with, both are worse than ineffectual.

The common idea that psychotherapy is synonymous with suggestion is altogether erroneous, for suggestion, is only one method and by no means the most important, or the most widely applicable. Persuasion and re-education, as well as, psycho-analysis are other, and probably more important measures.

As we aim to remove certain mental factors, it is obvious that scientific psychotherapy must involve: first, analysis, the determination of the particular mental factors responsible for the morbid condition; and, secondly, a rectification by means of procedures designed to eliminate or modify those factors. In all analyses we ultimately get back to emotional disturbances, deeply rooted in the interplay of the great instinctive forces of the mind. Thus, L. G., a soldier, knocked over by the bursting of a shell but who did not sustain any observable injury, was found unable to speak. This neurosis was due to emotional factors, chiefly an intense mental conflict between his instinctive desire to run away and the opposing, almost equally powerful factors, of duty, self-respect, and discipline. The conviction that

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(2) Brit. Med. Jour., Feb. 14, 1920.

he is unable to speak may be removed either by suggestion, with or without hypnosis, or with the aid of an electrical current passed through his neck. Or else, the end may be attained by the use of persuasion and reeducation, as follows: It is explained to the patient that examination has shown all the organs of speech to be perfectly healthy, that he has merely forgotten how to use these organs, and that it is proposed to teach him how to recover their use immediately. He is then told that if he fills his chest, opens his mouth, and blows out his breath, he will make the sound, ''ah.'' This result follows, of course, inevitably. He is next instructed how to produce other sounds; but it is not necessary to go through all the sounds in the English language, as the aim is merely to destroy the patient's conviction that he can not speak. This has, however, merely removed the proximate cause of the disorder. The fundamental cause can only be successfully removed if the patient ceases to be a soldier.

Anxiety neuroses are quite frequent among soldiers returned from the battle front and are often due to the patient's attempt to thrust particularly distressing memory pictures out of consciousness. This, however, is not successful, for they are merely driven beneath the surface of consciousness, which does not prevent them from influencing consciousness indirectly, and thereby producing characteristic symptoms. What must be done in such a case is to get the patient used to his war memories. He must regard them with comparative equanimity. When he has altered his perspective, so that these memories are no longer outlaws in the mind but have fallen in their proper places, the patient is cured.

The Anesthesia of Hypnosis. Articles by Gückel, E. Speer, and A. Friedländer, abstracted in *Therapeutische Halbmonatsh.*,[3] voice the opinion that the systematic employment of this procedure is antagonized by the mental perturbation of the patient, which makes the necessary concentration impossible. Narcotics are more certain and more rapid. Nevertheless, in cases in which narcotics are absolutely contraindicated, this method should not be neglected. The absence of the stage of

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(3) June 1, 1920.

excitation and the rarity of emesis and other subjective distresses due to anesthesia are its special advantages.

MECHANOTHERAPY

Cardiac Massage in Asphyxia Neonatorum. E. Ward[4] considers cardiac massage of considerable value as an aid to artificial respiration in the white asphyxia of the new-born. If smacking and clearing the pharynx do not make the child breathe, artificial respiration is resorted to for a minute or so. If this fails, the child's body is placed flexed and supine. The head and shoulders rest against the upper portion of the operator's forearm, and his left hand grasps the infant's left thigh. The fingers of the right hand are now pressed into the upper part of the flaccid abdominal wall beneath the diaphragm, and the right thumb is placed over the cardiac area externally. Massage can now be performed much more effectively than in an adult with the abdomen opened, and is sometimes strikingly successful. Every now and then the operator pauses for a moment to resume artificial respiration, by the only really efficacious method—traction on the arms; and then begins the massage again, if needful.

Ventral Posture in Treatment of Infantile Rumination and Habitual Vomiting. Arvo Ylppö[5] advocates placing infants subject to rumination and habitual emesis on a sheet tightly stretched across the bed (Figure 22), with the hands fastened to the sheet so as to make it impossible for the little one to turn about. This procedure has secured remarkable results in these cases partly, the author believes, by diverting the infant's attention by reason of its uncomfortable and unaccustomed position. It is, indeed, noted that rumination sometimes returns as soon as the infant becomes accustomed to the new position. In such cases the use of an easily removable hammock seems to have been of advantage.

This same posture is also of advantage in the cure of intertrigo and eczema of the buttocks and the back, as

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(4) Brit. Med. Jour., Feb. 21, 1920.
(5) Therap. Halbmonatsh., Feb. 1, 1920.

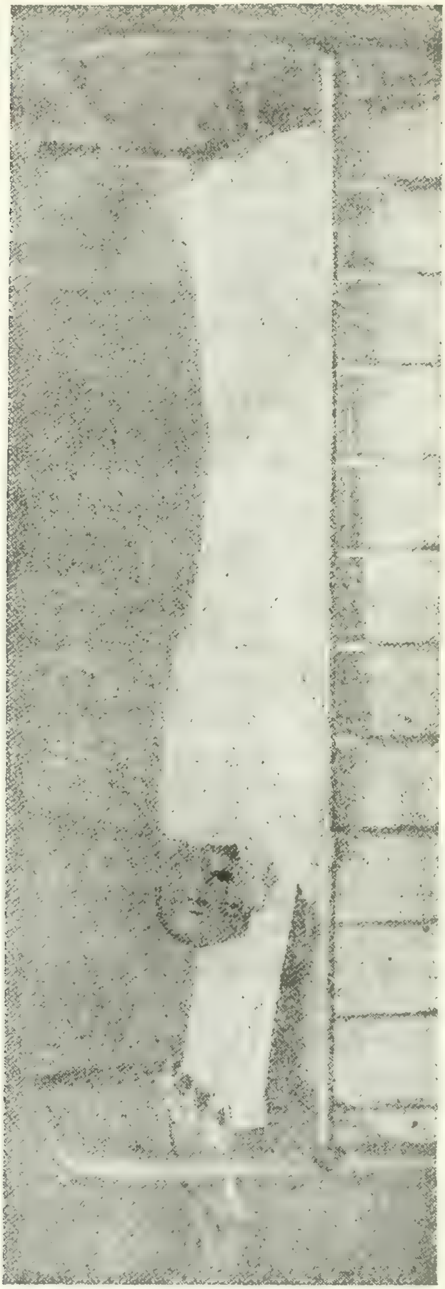

Fig. 22.

the infant does not have to lie in wet diapers, most of the urine passing through the sheet.

Georg Hauffe[6] recommends ventral posture in circu-

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(6) Zentralbl. f. inn. Med., 1919, p. 793; abstracted in Therap. Halbmonatsh., Feb. 1, 1920.

latory disturbances especially of heart and kidney patients, as he believes that this causes a diminution of pressure of the large abdominal blood-vessels. It is important that the chest be perfectly free; the arms serve as support for chin and forehead. The position is to be maintained for a few hours at a time.

HYDROTHERAPY

The Moving-Water Bath. A. D. Webster[7] calls attention to the effects, both reflex and mechanical, of moving water. The pressure and impact of the waves are stimulating, flushing the skin and calling into activity many muscle groups. These effects and results have been happily obtained and applied to many morbid conditions of wounded soldiers. It has been found that the muscles of the injured part are invigorated and their nerve connections restored more rapidly under the influence of moving water. Earlier mobilization is secured.

"The temperature of the water is a prime factor and its maintenance a necessity. This temperature need not be very high (cool 65° to 70°, tepid 80° to 85°, or warm 95° to 100° F.), but the effect of the moving water gives the impression through the skin nerves that the temperature is lower than it actually is."

"The effect on the tissues resembles that produced when salt has been added to the water or carbonic gas generated. The moving water in the bath may be electrified for additional effect, the current being taken from a dry cell faradic or galvanic battery, or the sinusoidal current may be employed."

"The apparatus is depicted in Figure 23. It consists of (1) a bath suitable for the attachment of the apparatus; (2) a motor regulating the movement of the water from a simple wavy motion to one of great turbulence; (3) a heater by which the temperature of the water is maintained or varied as required; and (4) a battery for electrification of the water."

"The combined effects of the moving water, of constant or varying temperature, and of the electricity are found

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(7) Brit. Med. Jour., Oct. 25, 1919.

to be most useful in speeding up the processes of restoration and repair in those cases in which the orthopedic surgeon has done his part.''

''The surging water affords at a higher temperature the stimulation and invigoration of a bath at a lower degree. This effect is enhanced or varied by saline and other medication of the water, or by the addition of electricity.''

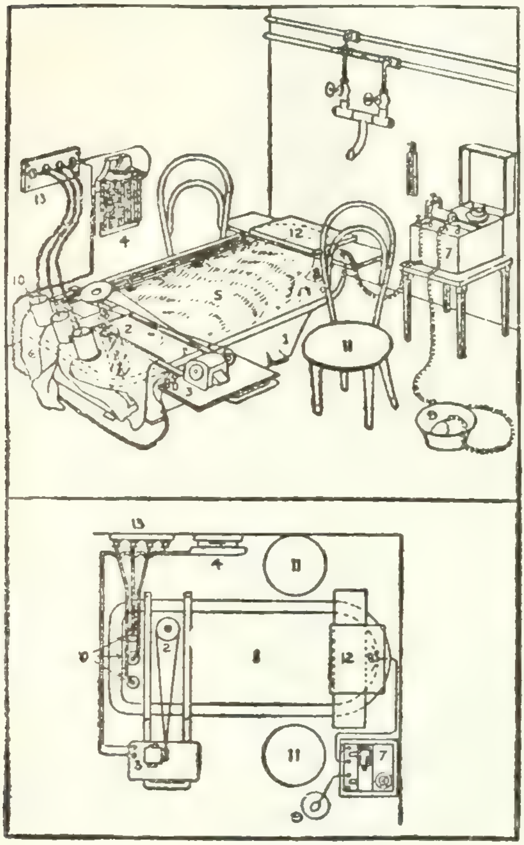

Fig. 23. Index to reference numbers on diagrams.

Primary essential:
1. A bath tub.

Movement of water:
2. Turbine propeller, with guard.
3. Motor to drive propeller.
4. Resistance to regulate speed of motor.
5. Surging water in bath tub.
6. Partial waterproof cover to prevent splashing over by turbine propeller.

Electrification:
7. Ordinary galvanic and faradic dry-cell battery.
8. One pole electrode immersed in the moving water.
9. One portable pole by which connection is made in various ways.

Heating:
10. One, two, or three heaters in operation as required to maintain or raise temperature of water.

General accessories:
11. Chairs for patient receiving treatment of right or left arm.
12. Removable cork seat for patient receiving treatment of leg.
13. Wall connections for electric motor and heater.

Methods of application:
The patient may sit on either chair for treatment of right or left arm, on removable seat at head of bath for treatment of leg, or lie in ordinary bath, the portable pole (9) being suitably adapted to each case.

''The bath may be used—(1) For its hyperemic effects. (2) For its restorative effect: (*a*) To limbs, recovering from severe muscle, bone, or nerve wounds; (*b*) to function, after orthopedic surgery; (*c*) to rhythmic return, in the various neurasthenic types. (3) For its general regulating and invigorating effects: (*a*) In soldier's heart; (*b*) in V.D.H., by flushing the skin and muscular areas without fatigue; (*c*) in neurasthenia, gauged to the tolerance of the patient; a mild wavy motion of the water and the small galvanic or rapid sinusoidal current soothes the neurosis, and more natural sleep is the result; (*d*) in returning health an agreeable constitutional."

ELECTROTHERAPY

Electrotherapy and the Medical Profession. Henry Finkelpearl[1] deplores the indifference of the medical profession toward physical therapy, and believes the time is approaching or is even now ripe for this branch of therapeutics to be made a part of the medical curriculum. Those who sneer at electrotherapy were not taught any better. Thus, Osler writes: "In sciatica electricity is an uncertain remedy." Yet it is the experience of every worker in electrotherapy that the static current will relieve the pain of nearly all sciaticas as quickly as morphine, without the disagreeable after-effects, and the danger of forming the habit. It is also known to workers in electrotherapy that every case of sciatica depending upon neuritis of inflammatory origin or upon arthritis can be cured by one or more properly selected forms of electricity. Of course, in certain forms of sciatica, additional etiotropic treatment is required. For instance, the proper modality of electricity will relieve the pain of a luetic sciatic neuritis, but to cure it we must use antiluetic remedies. Electricity will also relieve the pain of sacro-iliac luxation, but it can not be cured without mechanical support. Electricity will also relieve the pain of a sciatic nerve dependent upon a diseased prostate, or pelvic organ in the female, but the removal of the cause is of paramount importance.

Certain forms of chronic constipation can be cured by electricity; but constipation dependent on chronic ap-

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(1) New York Med. Jour., March 20, 1920.

pendicitis and belonging properly to surgery may be made even worse by an improperly selected form of application. Surgeons have learned that bone grafts grow more rapidly, joints limber up, and infected wounds heal more quickly when aided by suitable methods of physical therapeutics.

The Bergonie Chair: An Apparatus for Producing a Painless Alternating, Interrupted Electrical Current. W. F. Somerville[2] considers the Bergonie chair a much more convenient and agreeable method of employing the Faradic current than the ordinary medical battery. The power supplied from the mains activates a small Ruhmkorff coil, more powerful than the ordinary medical coil, giving a current of 500 m.a. The secondary current is employed with a break, producing about fifty interruptions a second, which is so adjusted that no sparking between the platinum points can occur. The metronome or rhythmic reverser through which the Faradic current passes, allows of alternating periods of muscular contraction and repose, and regulates the cadence of the muscular contractions so as to give one double beat each second. In one second of time the patient will experience one-quarter second of repose, one-quarter second of strong contraction from the positive pole, one-quarter second of repose, and one-quarter second of weak contraction from the negative pole. No tetany ever occurs. The whole body may be treated, or any particular part, as may be desired.

There are twelve electrodes, with a total area, in the case of a stout patient, of 10,000 sq. cm.; and with a current of 50 m.a. we may obtain an intensity of about 0.1 m.a. per square centimeter.

Sandbags are employed to fix the electrodes and to maintain perfect contact; and, by their weight, to increase the work done by the contracting muscles. At first twenty minutes will be found to be long enough for a treatment. Afterward it may be extended to forty-five or sixty minutes. The treatments should be given daily; indeed, they may be given twice daily, if rapid results are desired.

The apparatus has achieved its greatest reputation in

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(2) Glasgow Med. Jour., October, 1920.

the treatment of obesity, in which condition, when accompanied by suitable dietetic treatment, the muscular system is improved and developed, while the girth of trunk and of limbs is diminished.

As the muscles under stimulation do not alter in length, and there is no movement of joints, the articulations are left at rest, and the joints are better nourished. Hence the value of this method of treatment in rheumatism, gout, and other joint affections.

As the contractions and relaxations of the muscles under treatment augment the circulation within them, the heart is assisted in its work of making the blood to circulate, by a temporary conversion of the large muscles of the body into subsidiary hearts. The work of the heart is thereby better done, while it is itself doing less work; and the circulation through the whole body is improved. In this manner, and by the pressure on the veins and lymphatics stimulating a more rapid flow of blood toward the heart, the breathlessness which is so frequently present in heart cases, is relieved, blood-pressure is reduced, the pulse-rate rendered less rapid, and edema is dissipated. Consequent on the contractions and relaxations of the abdominal muscles constipation is relieved, and the whole well-being of the individual is greatly improved.

In cases of paresis of a limb this treatment is also valuable.

Thus the apparatus has a wide range of usefulness as an agent capable of improving muscular power and, either generally or locally, tissue metabolism; and this both directly and as a consequence of a more vigorous circulation of the blood and tissue fluids. In clinical practice, Somerville has seen its benefits in numerous cases, and not the least of its virtues is that its application is pleasant rather than disagreeable to the patient.

DIATHERMY

By surgical diathermy is meant the coagulation of structures by means of the heat produced by the resistance that tissues offer to high-frequency currents sent through them. Diathermy converts the whole tumor into a leathery crust, which is shed in course of time, the resulting granulating surface finally undergoing epitheliazation.

This method of treatment is gaining enthusiastic adherents among those surgical specialists whose field of operation prevents satisfactory radical excision, as in the mouth and throat and in the bladder.

Diathermy of Mouth and Throat: Norman Patterson[3] believes that since the introduction of diathermy the treatment of epithelioma of the mouth and pharynx has been entirely revolutionized. In cancer of the buccopharyngeal cavity it ought entirely to supersede cutting operations.

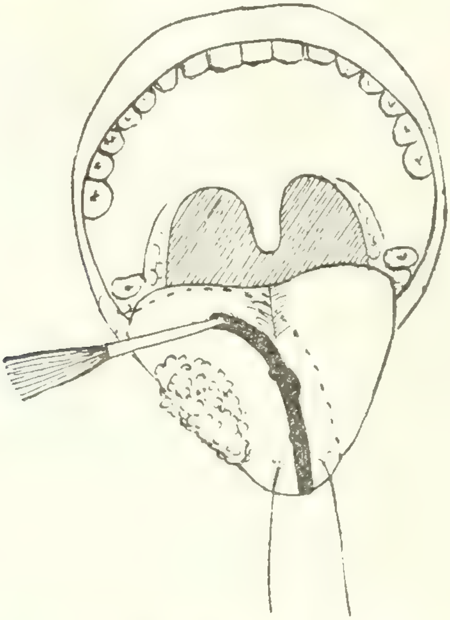

Fig. 24. Diagrammatic representation of the method by which a portion of the tongue may be excised by diathermy. The dotted line represents the probable extent to which sloughing will take place.

Technique: One electrode is placed over the chest or abdomen; it is a large plate, and between it and the skin are interposed several layers of lint, well saturated with normal saline. The electrode used for destruction of the tissues may take the form of a needle, narrow spatula, or button. The handle is insulated, and further

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(3) Lancet, Dec. 6, 1919.

insulation is obtained by the operator wearing rubber gloves. Owing to the resistance offered to the passage of the current, heat is produced and the albumin present in the tissues is coagulated. Coagulation passes for a considerable distance beyond the electrode (Fig. 24).

The electrode is applied before the current is switched on, and the current is turned off before its removal. If applied or removed when the current is flowing, sparking will result. It is well to begin with a weak current, gradually increasing its strength till bleaching of the tissues in the vicinity of the electrode occurs; a few seconds later bubbles will appear, and then it is nearly time to transfer the electrode to a different spot. Once the correct current has been found for any particular electrode it need not be altered.

Advantages of diathermy over cutting methods are as follows:

1. Bloodlessness: If the current is properly regulated and sharp-edged or sharp-pointed electrodes are avoided, the operation can be conducted without any immediate hemorrhage. Bleeding, even of an alarming nature, my take place subsequently when the sloughs are beginning to separate. This must be treated in accordance with ordinary surgical procedure.

2. Total destruction of the tissues in the neighborhood of the terminal and the impossibility of cell implantation.

3. Sterilization of the parts.

4. Structures some distance from the electrode are destroyed: Provided the operation be planned so that the electrode is applied three-quarters of an inch beyond the tumor margin, the actual destruction will extend to a distance of from an inch to an inch and a half from the edge of the growth. This is a very important point in favor of diathermy when contrasted with excision by knife.

5. Shock is generally much less than after a cutting operation: The explanation may lie, to some extent, in the fact that any nerve filaments encountered are thoroughly ''cooked'' in the process of diathermy.

7. The ease with which, if reappearance of the tumor takes place, diathermy can be applied again.

8. The scar is probably denser, and spreads farther into the surrounding tissues than is the case after cutting operations: It is well known that scar tissue acts as a barrier to the spread of malignant disease.

9. Tumors so situated that their removal with the knife is only possible after an extensive neck dissection, can be dealt with *per vias naturales*—*e. g.*, epithelioma of the base of the tongue, epiglottis, aryteno-epiglottidian folds, floor of the mouth, etc.

10. The operation being conducted in a bloodless field, the limits of the tumor can be defined with greater accuracy.

11. Patients too old or too feeble to undergo a cutting operation may sometimes be subjected to diathermy; and the operation, if thought desirable, can be carried out at several sittings.

12. The growth is practically always approached from the mucous membrane surface, or surface of origin, a point of no small importance.

For method of procedure and discussion of positive and negative indications and precautions, the reader must be referred to the original article. The results obtained, the author believes, justify the statement that no excision of a carcinomatous growth in the tongue, mouth, or pharynx, however small that growth may be, should be carried out with the knife if diathermy is available. Finally, the author warns that no time should be lost in Wassermann examinations—a microscopic examination of the suspected tissues will generally settle the diagnosis. Very serious consequences may follow on a positive Wassermann report in a case of epithelioma—and frequently the blood is positive—as the patient may be dosed with antisyphilitic remedies while the tumor grows apace.

Electric Methods in Treatment of Bladder Tumors. G. Kolischer[1] lays it down as a principle that tumors of the urinary bladder should be treated without opening the viscus, *per vias naturales,* by means of fulguration, galvanocautery, and the placing of radio-active substances in the viscus. Even single papillomata, benign to all appearance, if removed by excision after the blad-

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(1) Illinois Med. Jour., July, 1920.

der is opened, show a marked tendency toward rapid recurrence, which, as a rule, is multiple. Fulguration, the destruction of a tumor by means of the spark derived from high-frequency currents, is a method easily applied and does not even call for a special cystoscope. In all cases of papilloma, of a surely benign character, it is the method of choice; but, if a papilloma is of a meaty character, if it is infected or undergoing malignant degeneration, fulguration may be a failure as to eradication, and may carry infection into the surrounding structures or, in cases of malignant degeneration, cause an explosive recurrence of such extent that in a short time the whole pelvis becomes filled with carcinomatous masses. Such untoward results are easily understood when we consider the nature of fulguration. The spark not only burns, but also smashes the tissues. Tissues devitalized by divulsion furnish an excellent soil for the colonization of pathogenic organisms. The mechanical action of the spark may also, in cases of malignancy, carry cancer cells into the torn adjacent structures, thus fostering the implantation and development of inoculated cancer areas. In all instances of doubt, fulguration should be supplanted by the galvanocautery. This method evades the concomitant dangers of fulguration. Fulguration and galvanocautery ought to be followed in all doubtful or border cases by the placing of radio-active substances in the bladder.

Malignant tumors of the bladder that resist the endovesical application of radio-active substances should be treated by liberal opening of the bladder to obtain free access to its interior and permit the destruction of the growth by diathermy. The whole tumor is transformed into a leathery crust, and then the bladder is closed up again except for an opening admitting the drainage tube. Not the least advantage of this procedure is furnished by the fact that coagulation of the tumor immediately relieves the patient of all the pain that was felt in the growth, or radiating from it. In most instances, after the shedding of the crust and the following epithelialization of the resulting granulating surface, the vesical sinus will close up, the bladder will resume its normal function, and the patient will have good health for a period that may extend from months to years. It is, of course, understood that diathermy is always followed by radiotherapy.

RADIOTHERAPY

Under this heading we shall discuss the therapeutic application of radiant energy, which includes the use of sunshine (heliotherapy), ultra violet rays (''artificial alpine sun''), roentgenotherapy, and of radium. It seems advisable to adopt the term ''Curietherapy''[2] for radium therapy, as the latter has frequently led to confusion with the wider term, radiotherapy.

Radium as a Therapeutic Agent. C. W. Hanford[3] turns back the pages of medical history for us, and finds that a dozen or more years ago, when a patient presented an epithelioma it was excised, if possible, leaving an unsightly scar and an uncertainty as to recurrence. If excision were impossible, zinc chloride pastes were resorted to, which resulted in loss of good tissue. Rodent ulcers were classed as incurable. Keloids were the bane of the surgeon. Now, we look on radium as a specific in all these cases. Turning back again, we find that when carcinoma attacked the cervix and vagina, cauterization was all that could be done, and the end of these cases was indeed pitiful. But with a working knowledge of radium this distressing condition no longer exists, for radium stops the hemorrhage, destroys the foul discharge, and restores the cervix and vagina to a healthy appearance.

Radium has proved itself worthy of note, if only as a symptomatic agent, in controlling the bleeding from rectal cancer. Sarcomas of the antrum of Highmore are very amenable to radium. Uterine hemorrhages, not due to carcinoma or myoma, were formerly extremely annoying, whereas now the introduction of radium into the uterine cavity will produce a complete or temporary amenorrhea, according to the dose and length of time it is applied. Many cases of esophageal cancer have

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(2) The term "Curietherapy" was suggested by P. Degrais (London Congress, 1913), and adopted by the Congress of Gynecologists, Brussels, 1919.

(3) Med. Rev. of Reviews, March, 1920.

been reported as showing improvement from the use of radium. Its postoperative use furnishes a much needed crutch for the surgeon to lean upon, as his most painstaking work will not preclude a recurrence.

Curietherapy in Roentgen Dermatitis. P. Degrais and A. Bellot[4] report the successful use of Curietherapy in three cases of Roentgen-ray dermatitis occurring in radiologists, in two of which epitheliomatous degeneration had set in. By the use of 324 milicurie-hours in one case and 532, in another, they obtained, within several weeks, complete disappearance of the epitheliomatous condition and cicitrization of the ulcers.

[We certainly have here a most remarkable instance of "*similia similibus curantur.*"—Ed.]

Roentgen-Ray Therapy. Robert Knox[5] contributes a *résumé* of the therapeutic utility of the Roentgen rays in the light of our present experience, and emphasizes the fact that a thorough appreciation of the action of radiations on the normal tissues is requisite for their successful application to morbid conditions. Cells exposed to a beam of radiations from an *x*-ray tube, may (*a*) be stimulated; (*b*) depressed, or (*c*) destroyed. The determining factor in the end-result, so far as the radiations are concerned, is the intensity of the radiation and the duration of the exposure. In connection with the cell, the determining factor will be the resistance the cell possesses to external stimuli.

Diseases of the skin are so responsive to regulated doses of Roentgen rays, that they have led to the development of the radiodermatologist. Thus in treatment of ringworn of the scalp, these rays are very valuable; but the technique has to be very thorough to produce good results, and the method is not free from danger. Dermatitis and permanent alopecia may eventuate. Rodent ulcer very frequently calls for *x*-ray or radium treatment; and the results are, on the whole, an improvement on those obtained by other methods, except that operation offers, in an early case, a better prospect of cure. In malignant disease of the skin, radiations may be used for the earlier cases, a gradual increasing thickness of

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(4) Presse méd., June 5, 1920.
(5) Lancet, Aug. 2, 1919.

filters being employed later to ensure adequate irradiation of the deeper structures. Hyperidrosis readily yields to irradiations. The aim should always be to control rather than to suppress the secretion.

The technique is simple. Unfiltered radiations are employed. *Enlarged lymph glands* respond so readily to radiations, that we might employ the rays in a diagnostic as well as in a therapeutic sense. Enlarged glands due to simple inflammatory conditions give a very rapid response, unless suppuration has set in. Lymphadenamatous glands give a fairly rapid response, but not so rapid as the simple inflammatory ones. Sarcomatous and lymphosarcomatous glands give a rapid response in the majority of cases treated; there being, however, a tendency to recurrence. Tuberculous glands give a slow response as a rule. When treated early enough, the glands become quiescent and subside slowly, but if not completely fibrosed they tend to break out at a later period. Carcinomatous glands give a very slow response. They hardly ever disappear completely but they may be arrested in their growth. It is then sound practice to remove the glands surgically. Enlarged glands due to a mixed infection are fairly common and in these a mixed response is obtained. In the treatment of enlarged tuberculous cervical glands it is well to include the thoracic contents, particularly the mediastinal glands, in the field of irradiation.

Thyroid Enlargement: In exophthalmic goiter, sanitorium treatment combined with medicinal measures and radiations affords the treatment *par excellence.* The very acute case demands absolute rest in bed, quiet, careful diet, fresh air, and small doses of radiation daily over several weeks, before any sign of improvement shows itself. Later, when the severity of the symptom abates, the treatment should be gradually diminished in intensity and frequency; and, when the metabolic balance is gradually restored, the dosage may be reduced to three times a week; and later, to still longer intervals. Treatment should be continued at intervals over a long period of time in acute cases. Patients have a tendency to relapse if this is not done. Better results in the more chronic cases have been obtained by the administration of small doses at frequent intervals than were formerly met with when the larger doses were given at intervals of three or four weeks. The aim of treatment is to regulate the secretion from the gland. In parenchymatous goiter, surgery has first claim; likewise in malignant disease of the thyroid, operation offers the best chance of cure. Failing this, radium should be used. *X*-rays of a penetrating type may also be useful.

Enlargement of the thymus in children frequently requires treatment. *X*-rays will be found useful in these cases.

In leukemia it is good practice to irradiate in addition to spleen and bone marrow, large areas of skin surface to affect the blood circulating in it. This disease generally responds, for a time at least, to radiations, and there is no reason to assume that the improvement is only a variation in the course of the disease. The effects are too marked and exist for too long a period for this to be so. To produce profound effect on the blood cells, large areas of the skin surface should be irradiated with very lightly filtered rays. For the irradiation of the spleen and other deep organs, filtered rays are employed.

In *enlargement of the uterus* arising from fibromyoma, greater improvement in results has been obtained than was at one time thought possible. The advent of the Coolidge tube and apparatus capable of exciting it adequately have improved the technique and put within our reach the possibility of administering fairly large doses at a considerable depth from the surface of the body. Further, the introduction of the rays from ports of entry and the angling of the tube to focus the beams of rays on a given part have rendered it possible to increase greatly the dose at a given spot. The ovary on either side is taken as the landmark upon which the rays should be especially focused. The action of the rays appears to be primarily exercised on the ovary and its blood-supply, suppression of function leading to atrophy of the ovaries and cessation of the menstrual hemorrhage, which is the most troublesome symptom arising from fibromyoma. The atrophy of the ovaries is, however, also accompanied in a number of cases by a diminution in the size of the tumor. It is advisable, when that is possible, to commence treatment just after the cessation of the menstrual period. As a rule, in the average case, a satisfactory result may be looked for in from three to six seances, each consisting of from ten to twelve areas. The improvement is gradual, beginning, usually, after the second series of treatments. The menstruation or hemorrhage generally ceases after the third series of treatments. It is, however, advisable to administer one or two further series in order to keep up the action.

Filtered X-Ray Dosage. W. D. Witherbee and John Remer[6] studied the influence of different thicknesses of aluminum filters, in view of their importance in deep Roentgen-ray therapy. The fact that the barrier to a full destructive dose of *x*-ray in a deeply seated tumor is the toleration of the skin covering the part, led to the adoption of the cross-fire method of treatment. This method implies the use of a filter for the reason that the filtered ray gives only double the dose at half distance instead of four times. If the skin were at half distance in filtered exposure, and the tumor at full distance, the skin could tolerate two skin units without injury and the tumor at the same time would receive one and a quarter skin units, or practically double the effect. The authors do not see the necessity of using more than 5 mm. of aluminum as a maximum without the addition of glass, leather, or wood.

The Innovations in Modern Roentgenotherapy. J. T. Stevens[7] points out that the success being at present obtained with roentgenotherapy is due to four factors: (1) The interrupterless transformer; (2) the Coolidge tube; (3) filtration; and (4) crossfiring in deep work.

The interrupterless transformer makes it possible to deliver large quantities of electrical energy over long periods of time without variation in voltage.

The invention of the Coolidge tube gave us a tube which was able to receive the heavy output of the transformer over long periods of time without variation. By means of it we were placed in a position to do great good, and also great harm by imperfect technique.

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(6) New York Med. Jour., June 26, 1920.
(7) New York Med. Jour., Nov. 27, 1920.

The chief principle regarding filtration is: heavy filtration for deep work and lighter for superficial work. At present, sole leather, aluminum, and glass are favored, usually in combination. Stevens uses for superficial work a layer of sole leather and either one millimeter of aluminum or two millimeters of pure glass. In deep therapy he uses, as a routine, four millimeters of aluminum, two of glass, and a layer of sole leather.

Crossfiring has for its purpose the application of a sufficient dose of the rays to a pathologic process lying well under the superficial structures without injuring the skin. We attempt to deliver into the diseased area enough of the rays to destroy it. This is done by blocking out areas on the skin, through each of which is delivered as much of the rays as the skin will stand.

Management of Malignancy by Combined Methods. J. Thompson Stevens[8] pleads for friendly coöperation between the surgeon and the radiologist, followed by a combination of surgery, electrothermic coagulation, and radiation, or by the selection of the single method most likely to give the best results. He gives the following comparison of Roentgen and radium rays for therapy.

ROENTGEN-RAYS	RADIUM
1. Technique very exacting.	1. Easy to apply.
2. Rays less penetrating but in greater volume.	2. Rays more penetrating but in less volume.
3. Apparatus large and cumbersome.	3. Applicators small.
4. Non-portable.	4. Portable.
5. Danger from high tension.	5. No high tension danger.
6. Large areas can be efficiently treated.	6. Areas much smaller.
7. Costs moderate.	7. Costs high.
8. Deteriorates.	8. No deterioration.
9. Breakdowns frequent.	9. Spontaneous generation.

Application of Radium to Bladder Neoplasms in the Male. G. Timberlake[9] advocates using the "cystoscopic rongeur" as a means of holding a radium capsule and applying it. A capsule held snugly between the jaws of this instrument enables one to apply the radium to whatever part of the tumor desired, using a pulley "belt hook" to slip over the thumb and finger posts to make slipping of the capsule and its loss within the

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(8) Med. Record, Nov. 13, 1920.

(9) Jour. Amer. Med. Ass'n., July 31, 1920.

bladder impossible. After the instrument has been properly adjusted to the tumor mass, the cystoscope is removed and replaced by the obturator for the purpose of holding the fluid in the bladder.

Postoperative Roentgenization of Carcinoma. In a review article, Otto Strauss[1] arrives at the conclusion that we are not able as yet to decide definitely on the real value of this treatment, as there are observations both for and against it. Nevertheless, he is favorably inclined toward it, and advises the family practitioner not to neglect it for fear that he be blamed for not having employed all the means in his power to save the patient.

Strauss would not, however, rely on this treatment exclusively, but is in favor of combining it with intravenous injection of atoxyl 0.1 gm. combined with sodium arsenate, in ascending dosage, from 0.002 to 0.007 gm., given daily or every other day for a series of twelve injections. After a rest of fourteen days, the series may be repeated. Whatever intrinsic value this treatment has, is not yet decided; but it is certain that the supervision that this treatment enables the family physician to exercise over the patient is most salutary to him, and that by means of it, it is usually possible to get the patient to continue faithfully the Roentgen treatment as well.

Roentgen Treatment of Tuberculosis. E. Mühlmann[2] divides the indications for Roentgen-ray therapy in tuberculosis under two headings: conditions in which it is alone sufficient for cure, and cases in which it may be considered merely an accessory to other treatment. The basis of the use of Roentgen rays in tuberculosis is given by their power to stimulate the formation of fibrous tissue in granulomata. Thus, while indurated lymphatic glands are favorably influenced, caseated and suppurating glands are not. The tubercle bacilli themselves are insensitive to radiation. They are destroyed only by removal of suitable culture medium and incarceration in insensitive fibrous connective tissue. Hence, the fundamental requirement for successful roentgenotherapy

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(1) Therap. Halbmonatsh., June 1, 1920.
(2) Ibid., Jan. 15, 1920.

in tuberculosis is that the treatment must be employed at the earliest possible moment, that the disease must be a closed focus without marked tendency to spreading, and that the treatment be given by an expert. Much lack of success is certainly due to faulty technique.

Roentgenotherapy alone is capable of curing lupus, especially in its ulcerating and hypertrophic forms, while lupus planus vulgaris should be exposed to both Finsen and Roentgen treatment. The other forms of lupus, after epitheliazation has taken place under Roentgen treatment, are also best submitted to the Finsen ray. Tuberculosis cutis verrucosa gives brilliant results with Roentgen-ray treatment alone. Tuberculous lymphomata present the chief domain of roentgenotherapy in tuberculosis. The indurated lymphoma responds so well that operation should only be considered after unsuccessful roentgenization for from three to four months. If results then are not satisfactory, which might be due to caseation, operation should be resorted to, to be followed by roentgenization to prevent recurrence. Suppurating and still closed lymphomata should be punctured in a sterile manner, injected with 10 per cent. iodoform glycerine, and then irradiated. Fistulas should be curretted, and then treated with Roentgen rays. Tuberculosis of superficial bones, small joints and tendons, such as hand and foot tuberculosis and involvement of ribs, sternum, or scapula, especially when the foci are still closed, respond to the technique of deep therapy by cross-fire with energetic dosage and the use of filters. Fixation of joints is not desirable.

Among the forms of tuberculosis in which roentgenotherapy is merely an adjunct to the general hygienic-dietetic treatment of tuberculosis is involvement of large bones and joints; though it is possible that improvement in technique might enable us to affect the larger joints as favorably as we now can the smaller ones. In pulmonary tuberculosis, Roentgen treatment is useless in pneumonic or exudative processes. It is only indicated in cases in which, after general treatment, cessation of fever has been secured, and a stationary stage, or condition of slow progress has been attained. Then, appropriate Roentgen-ray treatment favors final cicatrization as evidenced by cessation of hemorrhage and of tubercle bacilli containing expectoration. Roentgenograms enable one to study this cicatrization process beautifully. The technique must be such as to favor fibrous tissue formation, but not disintegration of tissue.

Some successes have been obtained in tuberculosis of the peritoneum, of the epidydimis, and of the uterine adnexa. In tuberculosis of the urinary tract and of the rest of the genital organs there have been no definite results. The same might be said regarding tuberculosis of the digestive tract. It is surprising, in view of its accessibility, that laryngeal tuberculosis has not given good or at least uniform results; but such is the case.

The chief contraindications are to be found in feeble and feverish patients and in those with kidney disease. Diseased kidneys are incapable of taking care of the elimination of the great increase in disintegration products of tissues, so that aggravation of the kidney disturbance, and even uremic manifestations may set in. Of course, damage directly due to the roentgenization must be prevented by careful technique. The author directs attention to the necessity of covering the larynx with lead, during the treatment of cervical lymph glands, as otherwise after intensive irradiation prolonged hoarseness occurs as a rule. The salivary glands likewise should be protected, as in one case the author saw thus far permanent cessation of salivary flow.

Fresh-Air Sun Baths. Backer and Capelle[3] emphasize the fact that sun baths and fresh air treatment belong together. They are synergistic as skin and metabolic stimulants, and they antagonize each other's harmful possibilities: overheating and chilling. The author aims to show how this treatment may be conducted anywhere with simple, inexpensive means and yet efficiently. Though it must be admitted that a more powerful effect is to be obtained in the mountains, this should not deter us from employing this method of treatment in lowland. It can be carried out at all times of the year; but it is desirable to commence it before the onset of winter.

The effect of the treatment needs to be carefully con-

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(3) Therap. Halbmonatsh., Jan. 1, 1920.

trolled by its clinical results; for, it is not without possibility of doing harm. An evil possibility especially mentioned by the authors is excessively rapid disintegration of foci, with the picture of an inflammatory increase of the local process, which brings with it the danger of miliary tuberculosis. In such a case, the local treatment should be eliminated by covering, and general treatment continued. As the details of administration differ for summer and for winter, for sunny and for sunless days, the following practical points are of importance:

On sunny days in summer, the patient should not be exposed naked to the sun for the first few days, but should be kept in the shade all day, covered with a shirt; and after the second to eighth day outdoors also all night. On hot, sunny days, the direct sun baths are started—with covered head and trunk—applied to the lower extremities as follows: Sun bath, ¼ hour; shade, ½ hour. The exposure to the sun is gradually increased to ½ hour. However, the dosage must be controlled by the patient's comfort; and in cachectics, blonds, and persons with a delicate skin it pays to increase very slowly. When the patient has been found to tolerate well this partial bath, the whole body is next exposed naked to the sun—always protecting the head—for periods as above stated, though if the treatment is well tolerated the time may finally be extended to 1 hour for sun bath and ½ hour in the shade, which during the hot summer months may be looked upon as maximum dosage. On very hot days the patient lies naked in the shade. On cool summer days, the sun baths may be carried out without interruption throughout the day; on hot days it may be continuous, up to nine o'clock in the morning. Never give the sun bath during the time of maximal sun heat, about noon, between 11 a. m. and 2 p. m. To protect the eyes, use yellow-green eye glasses (blue and blue violet are directly harmful). Head protection may be secured by hats with broad brim, umbrellas, suitably suspended cloths or simply by keeping the head in the shade of a tree, etc. Excessive sunburn is prevented by alternating applications to front and back. When it has occurred, absolute suspension of the sun baths is required until the inflammation has subsided; and an indifferent salve may be used. To prevent over-heating, the patient's temperature must be watched. When it has occurred, cool sponging for bed patients or the cold douche with sprinkling hose for those who are not confined to bed should be resorted to. In patients with heart disease, application of cold compresses to the precordium is advantageous.

On sunless days in summer, the treatment becomes a fresh air bath, which, however, is not much less efficient. The most important thing to remember is the great cooling effect of wind, which, even when slight, may increase heat loss by four times, while a lowering of air temperature by as much as 18° C. merely doubles the heat loss if the air is still. Humidity likewise increases heat loss unproportionately. Hence the necessity for caution at the sea shore. In children, because of the relatively greater body surface as compared with mass, special caution is required to prevent chilling. The best guide to dosage is the patient's comfort. As a general proposition, the exposure of the naked body commences with the upper half of the body, down to the costal arch, for ½ to 1 hour, with intervals of similar period, or—with the addition of heating devices—continued until the patient has become fully warmed up. Whether a general bath is later advisable or not depends upon the patient's general condition. In some cases, it can be conducted, provided the abdomen is protected by flannel bandage or heating pad; for this part of the body is the most sensitive to chilling.

Localized lesions should be exposed to the sun without any dressing whatever (of course, flies should be kept off by wire screen, or by compresses of wood alcohol or turpentine placed around the affected area [A. Aimes]), provided the local process does not become aggravated by excessive hyperemia, and whenever local roentgenization is carried on alongside of this treatment. Under these circumstances the affected area should be kept covered. In torpid processes, on the other hand, the affected area may be exposed to the sun all day. Application of tincture of iodine for the first two or three days not only increases the hyperemia, but also offers protection against sunburn (danger of blistering: A. Aimes).

In Winter: Protection against wind and dampness are essential. The patient must be kept warm at all cost, by protecting the bed above and below with sufficient covering and, if necessary, by artificial heat. Very cautious gradual increase may be made in the fresh air exposures, by perhaps ¼ hour daily, the patient being fully clothed or covered on sunless days. The ultimate aim is to keep such patients continually in the open air—or at least in a room with all the windows open—all day and even during the night down to a temperature of —10° C. Strong, hardy patients may expose the naked chest to the air for periods of ¼ to ½ hour. This is a most valuable metabolic stimulus. In exceptional cases in which such artificial heating measures as arc light baths are available, the entire body may even be exposed during the winter up to 1 hour at a time. Ambulatory cases may, with chest exposed, exercise in the open air even in temperatures down to —5° C.

The authors give, in addition, valuable advice and illustrations for the improvisation, as well as institutional installation of suitable fresh-air-sun baths, for which the reader must be referred to the original article.

Fresh Air and Heliotherapy. P. Peyret[4] also insists upon the necessity of combining fresh air treatment with heliotherapy. He believes that the combination increases general vitality and thus favors the healing of tuberculous lesions. In addition to this, heliotherapy is of special value in localized lesions by the hyperemia it produces. Heliotherapy has no bactericidal power, as the chemical rays do not penetrate sufficiently. It does not prevent abscess formation, and abscesses do not heal any faster when they are insolated. On the other hand, it does seem to favor cicatrization of superficial lesions.

Uselessness of Artificial "Alpine Sun" in Pulmonary Tuberculosis. Karl Traugott[5] arrives at the conclusion that actinic-ray treatments, including even sun baths, are devoid of definite healing effect in pulmonary tuberculosis. This opinion he arrived at as the result of

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(4) Presse méd., Oct. 18, 1919.
(5) Therap. Halbmonatsh., July 1, 1920.

many years of use of the "alpine sun" in a large number of "ambulatory tuberculars," material which in itself was prognostically favorable. He was never able to obtain any objective proof of benefit, though he did not observe any harm from the treatment, either. It did not provoke hemoptysis in any of his cases; on the contrary, it might possibly have lessened the tendency to bleeding. Of course, advanced and progressive cases of phthisis with fever were never, and should never, be irradiated. The only definite result of the treatment is an euphoria, so marked that patients in whom no benefit whatever could be demonstrated objectively and even on close questioning regarding their symptoms, would often insist on continuance of the treatment, with the statement that they felt better after it. Some of these patients were subsequently greatly improved by three months' sanitarium treatment, some to such an extent that cough and expectoration disappeared, when much longer ambulatory treatment including "alpine sun therapy" had failed to make an impression.

While the author has no doubt of the value of actinic rays in surgical and dermal tuberculosis, he is willing to admit no more than a possibly tonic and prophylactic effect of this treatment in connection with pulmonary tuberculosis in children.

From an experimental standpoint, H. Hase[6] likewise arrived at the conclusion that the artificial "alpine sun" has no influence against tuberculous infection in guinea-pigs, even when daily treatments were employed immediately after infection. Ultra-violet rays are devoid of deep effects.

Light Versus Heat in Healing. A. La Laquer[7] reports that artificial "alpine sun" produces excellent results in superficial slightly secreting surface defects; but that it is not nearly so efficient in deeper wounds, and those that secrete profusely. In these latter, as well as in fistulas and deep bone suppurations of non-tuberculous nature, steam douches with or without warm baths are better than "alpine sun." For small ill-healing wounds, the hot air douche (Fön) is very efficient. Leg

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(6) Zeitschr. f. phys. u. diätet. Therap., 1920, p. 41.
(7) Ibid., 1919, p. 297.

ulcers with eczema contraindicate the use of a quartz lamp. In such cases, blue arc light is preferable.

Treatment of Rickets with "Artificial Alpine Sun." Good results are reported by H. Putzig[8] from the use of irradiation with actinic rays produced by the quartz lamp. He was led to use this treatment on the strength of the observations that rickets occurs most commonly in families of the poor living in dark habitations and that its incidence is greatest during sun-poor winter months. He employed general treatment applied to the child's chest and back, its eyes being protected, commencing with two times 3 minutes at a distance of 90 to 100 cm., three times weekly; he increases the treatment every other time by two minutes up to 15. Then the lamp is gradually brought as close as 75 cm. More powerful treatment has not been found necessary or desirable, as erythemia may result. The effect of this treatment, controlled by roentgenologic examination as well as clinical results, has been excellent, he asserts, and superior to the usual phosphorus cod-liver oil therapy. This method has also been used in a number of premature infants weighing 1,600 to 2,000 gm., in whom it produced most satisfactory results as far as the development of the infant is concerned, has hastened the healing of craniotabes, and prevented the appearance of rachitic changes in the extremities.

Postoperative Use of Electric Light. While electric light has been used for many years in the treatment of arthritis, sciatica, lumbago, etc., L. A. Sutter[9] urges radiant heat in the after-care of surgical cases also. He describes a simple apparatus:

"Have tinsmith make a box out of bright tin, about 14 inches long, 6 inches wide at the top and 8 inches deep. The can should flare out at the open side to about an 8-inch width. In the bottom of this can, two or more sockets can be soldered for incandescent lamps. All that is necessary is to put in two or more 60-watt lamps and a cord to connect the electric supply. The bright tin acts as a reflector focusing all the rays of the lamps on the area to be treated."

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(8) Therap. Halbmonatsh., April 15, 1920.
(9) Jour. Kansas Med. Soc., November, 1919.

As the result of the personal observations the author draws the following conclusions:

The electric light is the most convenient form in which to apply heat. It penetrates below the surface much deeper than any other form of heat. It relieves pain after a great many surgical procedures. It helps to hasten the subsidence of pus and hastens the healing in infected surgical cases. The author uses electric light in all infected cases.

Preventive Medicine

EDITED BY

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INTRODUCTION

The year 1920 has been remarkable from the standpoint of health. In the month of January, the predicted recurrence of influenza appeared in many places in the United States. It was limited in its prevalence to a fairly large number of urban communities, the rural districts escaping. It showed some tendency to be more severe in those places that escaped lightly in 1918 and to be light in the places which suffered severely in the earlier epidemic. However, with the exception of Detroit, nowhere was the epidemic so severe as it was in the autumn of 1918.

Following the high mortality of the winter, there was a marked and rapid improvement in health conditions as indicated by the death rate. The weekly death rate of fifty-seven cities during the summer and autumn as reported by the Vital Statistics Division of the Census Office indicates that never in its history has the country enjoyed such good health. It is confidently predicted that the number of deaths from all causes in these cities during 1920 will be enough below the average to offset the number of deaths over the average occurring during 1918. One factor in this was the unusually cool summer. In Chicago at least the diagram showing the death rate of the year by months was without an August-September peak. The height of this peak which for many years has been getting lower year by year has now reached the vanishing point. The recurrence of the epidemic of influenza in the winter made the January to March peak so prominent during each of the last thirty years, stand out like Gibraltar.

The very marked reduction in typhoid fever in cities during the last ten years was not interrupted in 1920. Our cities are now on a typhoid basis which the best governed cities of Europe may well envy.

The outstanding growth in public health work in recent years has been in what is commonly known as social hygiene. The states and many of the cities now have bureaus for the control of venereal disease. Where there were very few governmental venereal disease clinics five years ago, the number is now very large. There is a general agreement that the war time program for the Army and Navy shall be adopted by civilian governments for use among civilians. But when it has come to the details of this program there has been endless discussion both in this country and abroad. Particularly acrimonious has been the discussion of medical prophylaxis in Great Britain. In this country the subject has been avoided in the main apparently because each side was timid about approaching it.

The U. S. Public Health Service publishes a list of state and federal appropriations which shows how general the movement has become.

Owing to the insufficient registration it may be years before any statistical demonstration of results can be made.

The year has witnessed no signal gain in our knowledge of influenza. The epidemiologists and the laboratory research men have been equally unsuccessful in determining measures or in making discoveries calculated to prove helpful in the next world pandemic of the disease. An increase in the study given the bacteriology of common colds and a little more attention paid them by health officers may be ascribed to the influence of the influenza epidemic. Perhaps several years of effort along these lines may be a necessary foundation for a more direct attack on influenza.

While the record made by our Army and Navy authorities in the control of typhoid and diarrheas during the World War left nothing to be desired, the same can not be said of the control of respiratory infections—pneumonia, bronchitis, influenza and including measles. Our hope of controlling this group of diseases in later wars is predicted upon a better knowledge of them gained in times of peace. It is to be hoped that we may see headway made in this direction right speedily for the need is great.

The last forty years has witnessed a great change in the seasonal distribution of disease as shown by the death rate. The sickness rate of the summer-autumn months has decreased because of improved sanitary standards and lessened prevalence of typhoid and the diarrheal diseases of infancy. The sickness rates of the late winter and early spring have not come down proportionately. In fact there are communities in which so far from coming down they are higher than they were in 1880. We need light, and urgently, on the acute respiratory infections from common colds to pneumonia and I hope that interest in the subject now in evidence will be continued and multiplied.

W. A. EVANS.

PREVENTIVE MEDICINE

MEDICAL ECONOMICS

Voluntary Health Insurance. A. C. Burnham[1] suggests a substitute for compulsory health insurance. His suggestion is that a community of 10,000 people voluntarily associate themselves together as a group; that they pay $5 each a year for medical service. To serve them they would employ the following personnel:

One medical consultant (part time), one surgeon (part time), one assistant surgeon (part time), one eye, ear, nose and throat surgeon (part time), one gynecologist (part time), one pathologist (part time), one obstetrician (part time), one dentist (full time), five visiting physicians (full time), five visiting nurses (full time), one chief clerk (full time), three assistant clerks (full time), one laboratory technician (full time), one *x*-ray technician (full time).

In some instances, patients would be cared for in hospitals and several adjacent groups might well combine for hospital services. The Framingham, Mass., survey showed the sickness rate to be 6 per cent. In other words, in a population of 10,000, 600 would be ill each day. Of these, from 10 to 20 per cent. or from 60 to 120 would be in bed. The five visiting physicians would be required to make from fifty to seventy-five visits a day.

The Cincinnati Unit. One of the most interesting experiments ever made is the social unit plan now being tried in Cincinnati. The district embraces about one-quarter of a square mile and in it there live approximately 12,000 people. The density of population is 45,900 to the square mile or 71.8 to the acre. Of the population, 1,447 are foreign born and 128 are colored. In the district thirty-eight physicians live. Medical

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(1) Med. Record, Jan. 17, 1920.

services are directed by a medical council composed of twenty-six of the thirty-eight physicians of the district. This medical council employs a paid executive. Sixteen of the local physicians are employed part time at $3.00 an hour examining children and adults at the Center. Treatment is not given at the Center except in emergency. Patients are referred for treatment to family physicians, hospitals, dispensaries and health department physicians. The medical council is elected every two months. The medical executive gives five hours a day to his work. The field work is done by six nurses, and a nurse's assistant. Each nurse serves all nursing needs in her district—prenatal, maternity, infant welfare, tuberculosis and general nursing—but not school nursing or contagious disease nursing. The backbone of the system is keeping the people interested in sanitation and hygiene through community councils on various aspects of health and other community welfare elected by the people themselves.

Dr. Haven Emerson,[2] who studied this experiment, reports his estimate of its accomplishments:

1. It has reached a large proportion of the expectant mothers needing prenatal advice beyond the third month of pregnancy.
2. There has been early and continuous supervision of all babies born in the district as well as maternity care of the mothers.
3. All the children of pre-school age have been examined, and a large proportion of the physical defects have been corrected.
4. All cases of active tuberculosis have been discovered and brought under guidance.
5. The sick were nursed as required under the guidance of their own physicians.
6. The influenza situation was met exceptionally well.
7. There has been an improvement in general sanitation without recourse to police courts.
8. The patients have been interested and educated in health to an exceptional degree.

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(2) N. Y. Med. Jour., Dec. 13, 1919.

Supply of Physicians. As compared with the people of Europe we of the United States are abundantly supplied with physicians. We have one physician to every 700 inhabitants which is twice the relative supply of England and France, and three times that of Germany and Austria. However, in the opinion of E. C. Meyer,[3] our rural districts are not much better supplied than is the average in European countries, cities and rural districts taken together.

Basing his estimates on various sickness censuses he concludes that the sickness rate is 25 per thousand or there are 2,600,000 people sick at any given moment in the United States. The sickness disability rate is 18 per 1,000 or about 1,800,000 people are disabled from sickness at any moment. Since the average duration of each illness is seven days he estimates the number of illnesses in the country yearly as 135,850,000. The number of working days lost annually by the male population, 5,250,000 and by the female population, 7,650,000.

Of the disabled sick at least one-fourth, 24 per cent. in one survey, and 27.2 per cent. in another, are without medical attention. Of the cared-for sick, 61 per cent. are cared for in homes, 9.8 per cent. in hospitals and 2 per cent. in dispensaries; 20 per cent. of illnesses cared for in hospitals are given inadequate care. Of the patients cared for in homes 45 per cent. receive inadequate care. The supply of physicians is ample but the public does not care for their services, as their welfare demands. One way of remedying this, Meyer says, is by community medicine with consequent reduction in cost.

At the University of Wisconsin free medical service is given to students with a resultant reduction in sickness and absenteeism and a greatly increased student efficiency. In deciding whether it pays a physician better to attend a pay clinic or to do private practice we should take into account the fact that 50 per cent. of the gross income of the physician goes toward the expense of doing business. A physician who is paid $2.50 an hour is paid at the rate of $5,250 a year for a

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(3) Amer. Jour. Pub. Health, June, 1920.

7-hour day and this is equivalent to an income of $10,250 a year. The evidence from the Mayo Clinic and the Boston Dispensary as well as the arguments adduced above all in the opinion of Meyer demonstrate the advantage of community medicine.

Distribution of Physicians. The *Illinois Medical Journal*[4] gives the following distribution of physicians in the United States. The list includes homeopaths and eclectics but not practitioners of limited medicine such as osteopaths, chiropractors, naturopaths, napropaths and other drugless healing cults.

Doctors of medicine represent the largest single group of professional men in the country. There are about 150,000 graduate physicians in the United States, of whom 140,000 are believed to be in active practice.

The American Medical Directory lists 147,812 names and indicates that physicians are located throughout the country as follows:

State	Number
Alabama	2,530
Arizona	333
Arkansas	2,587
California	5,929
Colorado	1,713
Connecticut	1,701
Delaware	264
District of Columbia	1,237
Florida	1,296
Georgia	3,442
Idaho	458
Illinois	11,095
Indiana	4,765
Iowa	4,004
Kansas	2,668
Kentucky	3,483
Louisiana	2,060
Maine	1,179
Maryland	2,268
Massachusetts	5,926
Michigan	4,598
Minnesota	2,596
Mississippi	1,975
Missouri	6,063
Montana	661
Nebraska	1,960

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(4) October, 1920.

State	Number
Nevada	159
New Hampshire	666
New Jersey	3,153
New Mexico	456
New York	15,877
North Carolina	2,257
North Dakota	604
Ohio	8,089
Oklahoma	2,672
Oregon	1,157
Pennsylvania	11,495
Rhode Island	762
South Carolina	1,433
South Dakota	695
Tennessee	3,481
Texas	6,246
Utah	488
Vermont	653
Virginia	2,552
Washington	1,698
West Virginia	1,759
Wisconsin	2,817
Wyoming	254
Medical officers U. S. Army and Navy (1918)	1,638

Hospital Bed Supply of Certain American Cities. J. G. R. Manwaring[5] gives the following as the hospital bed equipment of a number of American cities:

City	Hospitals	Population	Beds
Albany, N. Y.	7	115,000	1192
Bismarck, N. D.	2	80,000	265
Butte, Mont.	4	90,000	370
Cambridge, Mass.	7	112,000	434
Camden, N. J.	3	112,000	335
Canton, Ohio	4	80,000	210
Charleston, S. C.	6	95,000	426
Chester, Pa.	1	82,000	125
Duluth, Minn.	5	110,000	552
East St. Louis, Ill.	6	90,000	254
Elizabeth, N. J.	4	95,000	550
Erie, Pa.	5	100,000	449
Evansville, Ind.	7	100,765	437
Fort Wayne, Ind.	5	85,000	337
Harrisburg, Pa.	7	80,000	253
Jacksonville, Fla.	8	112,000	393
Kansas City, Kan.	3	100,000	620
Knoxville, Tenn.	7	85,000	319
Lawrence, Mass.	5	100,500	354
Little Rock, Ark.	5	80,000	509

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(5) Jour. Mich. State Med. Soc., April, 1920.

City	Hospitals	Population	Beds
Lowell, Mass.	4	115,000	762
Lynn, Mass.	4	100,000	385
Oklahoma City	11	110,000	586
St. Joseph, Mo.	7	90,755	443
San Diego, Cal.	5	90,455	517
Savannah, Ga.	8	87,500	400
Somerville, Mass.	2	90,000	75
Troy, N. Y.	7	80,000	669
Utica, N. Y.	5	90,000	480
Waterbury, Conn.	3	115,000	251
Wilmington, Del.	4	112,000	340
Yonkers, N. Y.	7	95,000	430
Average	5¼	98,826	429

One bed to 230 people.

Community Equipment for Tuberculosis. D. B. Armstrong[6] answers nine questions relative to tuberculosis as follows:

How much tuberculosis is there? Approximately 1 per cent. of the entire population of Framingham has active tuberculosis.

How many active cases should be under care? In Framingham they find from nine to ten cases which need to be under care for every annual death.

What percentage of cases should be reported in the early stages? In Framingham this percentage is now 75; when the experiment began it was 45.

What are the minimum institutional needs for cases of tuberculosis? In Framingham they need from one to two beds for each annual death in the community.

What percentage of the cases should be given hospital or sanitarium care? In Framingham this is about 33 per cent. of the active cases.

What constitutes a comprehensive educational program? An educational program should fight: (*a*) infection, by promoting respiratory hygiene, improving milk supplies, improving general sanitation; (*b*) disease by lessening stress or strain, mental or physical; by improving economic, social and institutional conditions; by promoting constructive personal hygiene; (*c*) by popularizing and making adequate provision for institutional and home treatment.

What community machinery is necessary? (*a*) Medi-

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(6) Jour. Outdoor Life, November, 1920.

cal machinery to find cases, a school or factory physical for every 3,000 individuals, clinic and consultation service; (*b*) nursing service (one nurse for 2,000 to 3,000 people); (*c*) institutional equipment; (*d*) educational program; (*e*) organization.

What will it cost? In Framingham it is costing $2.00 *per capita.* This should be divided equally between money raised by taxation and money raised by philanthropy.

What results can be hoped for? In Framingham, the tuberculosis mortality has been reduced from 121 per 100,000 before the experiment began to 81 per 100,000 —a reduction of about one-third in three years.

The examiners are now finding fewer cases of tuberculosis and especially fewer cases of advanced tuberculosis indicating that this rate is due to decline still further.

Armstrong asks other communities to measure themselves by the Framingham yardstick. For a community having 3,000,000 population and 4,000 deaths from consumption the Framingham yardstick would give: Cases, 30,000; beds needed, 4,000 to 8,000; cases needing hospital and sanitarium treatment, 13,000.

What will it cost? $6,000,000 a year.

What results can be hoped for? A reduction of deaths from about 4,000 to 3,000 in three years in spite of the normal growth of the city and progressive reduction later on.

A Tuberculosis Survey of Oneida County, N. Y. The methods of a tuberculosis survey made in Oneida County, N. Y., are described by B. W. Billings.[7]

The survey consisted of calls at 2,796 homes in the county and almost house to house canvass in the city to locate patients. Three diagnostic clinics were held in Utica, two in Rome and about ten in the county outside of these cities. It was essentially a case-finding campaign. All kinds of organizations coöperated. The newspapers gave most extensive and sympathetic publicity. The campaign lasted from May through December, 1919. It cost $8,000.

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(7) Boston Med. and Surg. Jour., Sept. 16, 1920.

Miss Billings says of the cost: "It would appear to be a modest sum when it is remembered that 117 unregistered cases of tuberculosis were located for follow-up work.

The recommendations for Utica were: An evening clinic, a supervising nurse and three assistants; for Rome, a clinic and a nurse; for the county, clinic service and nurses.

The results were—(*a*) Utica, one nurse; (*b*) Rome, a clinic and a nurse; for the county, clinical service.

[According to Miss Billings' statement, it cost $68.37 to find each of these cases of tuberculosis. In view of the slight contagiousness of consumption, the little that can be done for the patients and the impossibility of keeping cases of consumption under control an expenditure of $68.37 per capita for locating cases of consumption is altogether too much to pay. For one thing cases of consumption can be located for much less than that. Of the 174,000 people in the county only 1,287 were examined. The cost for each examination was $6.21. Again an unwarranted amount.

I can see no way of justifying this expenditure except it be on the ground of interest excited. In other words, mob psychology. The result in this direction could easily have justified the means. And yet the results as claimed do not of themselves justify the conclusion that the community was thoroughly awakened. The "results cost" of health campaigns needs to be more accurately weighed.—Ed.]

General Hospitals and Tuberculosis.[7] M. Taschman and B. Stovelman hold that general hospitals should have tuberculosis wards to supplement the dispensaries and sanitariums. As it is, the sanitariums send back from 5 to 20 per cent. of their cases as not being tuberculous and care for advanced cases comprising from 30 to 50 per cent. of their total population.

Taschman and Stovelman sent a questionnaire to two groups of general hospitals and sanitariums which yielded them the following:

1. Only about 50 per cent. of the large general hos-

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(7) Amer. Jour. Med. Sci., May, 1920.

pitals have tuberculosis wards or services and the tendency is to abandon these or not to develop them further as sanitariums are built.

2. Over 90 per cent. of the sanitariums advocate tuberculosis wards and services in general hospitals.

Some New York Customs of the Sick. "The Problem of Disease" is the title of a valuable study of medical customs of various groups in New York made by the Public Health Committee of the New York Academy of Medicine.[8]

The birth rate amongst the most prosperous group of people was 11.5 per thousand as compared with 26.5 for the least prosperous group. The average birth rate was 19.1 but it was 33.9 for Slavs, 22.8 for Italians, 19.1 for Hebrews, 16.1 for native born and 10.8 for Germans.

Of cases of illness 11.6 per cent. went to a hospital, 13.2 per cent. were treated in dispensaries, 37.7 per cent. consulted private physicians, 4.1 per cent. lodge doctors, 0.8 per cent. a visiting physician from an institution, 10.8 per cent. called a midwife and 23 per cent. consulted a druggist or indulged in self medication.

The least use of the dispensaries was made by the Slavs, next by the Italians, followed by the Germans, Hebrews, negroes, native-born and Irish in the order given. The Slavs, Italians, native born and Germans used the hospitals but slightly. The Hebrews, the Irish and the negroes used them most.

The maternity hospitals were patronized especially by the Hebrews and negroes. The Slavs and Italians made most use of midwives.

The Slavs, Germans and Hebrews employed a private physician in more than 50 per cent. of cases of illness, the natives and negroes 42 per cent., the Irish least of all. The greatest use of the lodge doctor was made by the Hebrews followed by the Germans and Italians. Of the Irish, 34.5 per cent. used patent medicines; the proportion of Hebrews using patent medicine was 7.6; the native-born and the negroes used it for something more than one-quarter of their illnesses.

Unexpected statements are: "There is no apparent

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(8) Modern Med., July, 1920.

correlation between the employment of private physicians and income'' and ''there is evidently no relation between maternity hospital treatment and economic status.''

A study of the trend of custom in New York City shows a growing tendency toward hospitalization, a practically stationary condition with regard to the employment of midwives and a slight decrease in the attendance by private physicians. There is a tendency toward the hospitalization of certain diseases irrespective of economic conditions. Of the influenza cases more than three-fourths were treated by private physicians and less than 2 per cent. in hospitals. More than 14 per cent. of the pneumonia was cared for in hospitals. Only 7.6 per cent. of the coryzas were treated in dispensaries, the remainder being cared for as follows: 48 per cent. by self medication and 38.6 by service of private physicians. More than one-fifth of the tonsillitis cases went to the dispensary.

Antitoxin in Diphtheria. The New Zealand Public Health Department[9] reports the returns to a questionnaire sent to twenty-two hospitals asking as to the efficacy of antitoxin in curing diphtheria.

The totals were:

Antitoxin given first day	1.6 per cent. died
Antitoxin given second day...	1.5 per cent. died
Antitoxin given third day.....	2.7 per cent. died
Antitoxin given fourth day....	14.7 per cent. died
Antitoxin given fifth day	3.4 per cent. died

Efficacy of Measures for the Prevention of Disease. That elevation of the standards of living is doing more to prevent disease than all the work of health departments is the opinion of G. A. Soper.[1] With the exception of pneumonia-influenza-bronchitis all forms of contagion are becoming milder in America and northwestern Europe. When occasional cases of cholera, typhus and plague are brought to Western countries they do not spread. Measles, scarlet fever and diphtheria are diminishing markedly. Typhoid fever, diarrhea and dysentery and other enteric diseases have yielded even more.

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(9) Med. Officer, May 22, 1920.
(1) Jour. Amer. Med. Ass'n., Nov. 8, 1919.

In fact with the exception of pneumonia-influenza-bronchitis we do not have the old-fashioned type of any of the infections.

With smallpox the improvement can be ascribed to vaccination; with diphtheria to antitoxin at least in part; but with the remainder it is a result of higher standards of cleanliness, and of living in general. Soper does not stop with ascribing good results to sewage disposal, garbage collection and water protection, but adds any measure that materially contributes to the cleanness, convenience and order of a community and helps to eliminate disease, mentioning good street pavements, adequate lighting systems, suitable police regulations and agreeable parks.

[Both in this country and in Great Britain there are men who claim that the low death rates and the general healthfulness of the last year are due in greater part to the higher wages, especially the higher wages paid labor, than to any other factor.—Ed.]

HEALTH ADMINISTRATION AND ORGANIZATION

Expenditures for Health. H. B. Hemenway[2] has prepared a set of tables showing the expenditures for health protection, and the losses from communicable diseases, as compared with expenditures on the fire department and fire losses in some fifty Illinois towns.

The following figures for Rockford, a city with 57,897 inhabitants, will serve to illustrate. The aggregate losses due to communicable diseases are $1,316,595 or $22.74 *per capita*. The loss is 5.24 per cent. of the assessed value of the property in Rockford. The *per capita* expenditure for health is 8 cents, the *per capita* loss from communicable disease is $22.74. The *per capita* expenditure on the fire department is $1.60 and the *per capita loss* from fire is 47 cents. The ratio of loss to expenditure as regards health was 284 to 1; as regards fire, 0.29 to 1.

The Training of American Health Officers. J. A. Tobey[3] analyzes the data relative to health officers in

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(2) Amer. Jour. Pub. Health, February, 1920.
(3) Ibid., November, 1920.

American cities of 10,000 and over as given in a recent number of the *Public Health Reports.* According to the 1917 estimates of the Census Bureau, there were in that year 708 cities with population in excess of 10,000. Of these 685 or 96 per cent. have health officers. Of the health officers, 78 per cent. have an M. D. degree (536); 38 per cent. (266) were on a full time basis; three have a D. P. H.; one a C. P. H. and one an LL. B. These health officers went by sixty different titles. Of the 149 laymen three had the D. P. H., one Ph. D., one a C. E. degree; one was a pharmacist; one was a nurse and five were veterinarians.

Of the health officers in Alabama and South Carolina all were full-time men. No town in Arizona, Delaware, Idaho, Nevada, Oklahoma, Oregon or Wyoming had a full-time health officer. Only 60 per cent. of the health officers in West Virginia and Indiana were whole-time men. In Mississippi 12 per cent., New Jersey 71 per cent., Pennsylvania 64 per cent., Massachusetts 54 per cent., Michigan 42 per cent., Ohio 32 per cent., Connecticut 30 per cent., California 27 per cent., New York 19 per cent., Texas 16 per cent., Illinois 20 per cent. In New York, all health officers are doctors of medicine, in California, Illinois, Indiana, Michigan and Texas more than 95 per cent.; in Pennsylvania 26 per cent., in Massachusetts 32 per cent., in New Jersey 40 per cent. Of the physicians 26 per cent. are on a whole-time basis; of the laymen 86 per cent.

Rating Health Officers. J. A. Tobey[4] proposes the following score card for rating health officers:

	Perfect	Minimum-allowable
I. Personal qualifications:		
Executive ability	7	
Initiative and enthusiasm	5	
Tact	5	
Broadmindedness	3	
Aggressiveness	3	
Perseverance	3	
Ambition	2	
	28	18

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(4) Amer. Jour. Pub. Health, November, 1919.

	Perfect	Minimum-allowable
II. Moral qualifications:		
Integrity	10	
Character	10	
	20	20
III. Mental qualifications:		
Common sense	7	
Judgment	6	
Memory	2	
Literary ability	3	
	18	12
IV. Physical qualifications:		
Health	7	
Energy	5	
Appearance	3	
Public speaking	3	
	18	12
V. Professional qualifications:		
General education	2	
Special training in public health	4	
Experience	5	
Achievements in public health	5	
	16	8
Grand Total	100	70

Standing of Cities in Typhoid Control. The *Journal of the American Medical Association*[5] again publishes the previous year's typhoid history of American cities. The classification is as follows:

DEATH RATES FROM TYPHOID IN 1919

Honor Roll (from 0.0 to 2.0)

Spokane, Wash.	0.0	Tacoma, Wash.	1.6
Hartford, Conn.	0.9	New Bedford, Mass.	1.6
Chicago	1.2	Cambridge, Mass.	1.7
Scranton, Pa.	1.3	New York	2.0

First Rank (from 2.0 to 5.0)

Newark, N. J.	2.1	Worcester, Mass.	2.8
Boston	2.2	Fall River, Mass.	3.0
Jersey City	2.2	St. Paul	3.0
Seattle	2.3	Columbus, Ohio	3.0
Cleveland	2.4	Minneapolis	3.1
Cincinnati	2.6	Toledo, Ohio	3.1
Springfield, Mass.	2.6	Oakland, Calif.	3.2
Camden, N. J.	2.7	Denver	3.2

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(5) March 6, 1920.

San Francisco	3.3	Rochester, N. Y.	3.8
Providence, R. I.	3.4	Paterson, N. J.	4.2
Lowell, Mass.	3.4	Omaha	4.4
Milwaukee	3.5	Philadelphia	4.4
Portland, Ore.	3.6	Dayton, Ohio	4.5
Richmond, Va.	3.7	Los Angeles	4.7
Washington	3.7	Indianapolis	4.7
Bridgeport, Conn.	3.8		

Second Rank (from 5.0 to 10.0)

Grand Rapids, Mich.	5.1	Trenton, N. J.	6.8
Detroit	5.3	Buffalo	7.0
Salt Lake City	5.4	Albany, N. Y.	7.6
New Haven, Conn.	5.7	Baltimore	8.9
St. Louis	5.8	Louisville, Ky.	9.0
Reading, Pa.	6.1	Atlanta, Ga.	9.6
Pittsburgh	6.2	San Antonio, Tex.	9.6
Syracuse, N. Y.	6.7		

Third Rank (from 10.0 to 20.0)

Kansas City, Mo.	11.2	Birmingham, Ala.	14.6
Dallas, Tex.	12.2	Nashville, Tenn.	15.8
New Orleans	13.7		

Fourth Rank (Over 20.0)

Memphis	58.4

The Journal says: "It is doubtful whether there is today any other country in the world in which the nine largest cities could show so low an average typhoid rate." "The continued lowering of typhoid death rates in American cities is one of the outstanding features of modern sanitary progress."

Records for Infant Mortality. The American Child Hygiene Association[6] reports on the infant mortality rate of 269 American cities.

The ten cities on the honor roll are: Brookline, Mass., with 40 deaths of babies under 1 year of age for each 1,000 births; Berkeley, Cal., 44; Marinette, Wis., 45; Aberdeen, Wash., 45; Everett, Mass., 47; Madison, Wis., 47; Piqua, Ohio, 48; Mansfield, Ohio, 48; Alameda, Cal., 49; Renssalaer, N. Y., 50.

Cities having rates over fifty and therefore falling short of the honor roll but having highly creditable records were: Eureka, Cal., 51; Santa Barbara, Cal., 53;

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(6) Special Bulletin, Oct. 1, 1920.

La Crosse, Wis., 54; Pasadena, Cal., 54; Seattle, Wash., 54; Mt. Vernon, N. Y., 55; Fort Wayne, Ind., 57; Everett, Wash., 59; Topeka, Kas., 59; Minneapolis, 61; Houston, 61; San Diego, 61; East Orange, N. J., 61; Evanston, Ill., 61; Oshkosh, Wis., 61; Redlands, Cal., 61; Oakland, Cal., 62; Pittsfield, 62; Elgin, Ill., 62; Melrose, Mass., 63; Northampton, 63; Ogden, 63; Cambridge, 64; Fresno, 65; Lincoln, 66; St. Paul, 67; Jamestown, N. Y., 67; Marion, Ind., 67; Eau Claire, 67; Battle Creek, 68; Portland, 69; Galveston, 69; Salem, 69.

Child Hygiene Divisions. Anna E. Rude[7] gives the following list of states having child hygiene and child welfare divisions in their state health departments with five exceptions and the year in which such divisions were inaugurated. Louisiana, 1912; New York, 1914; Kansas, 1915; Ohio, 1915; New Jersey, 1915; Massachusetts, 1915; Montana and Illinois in 1917; Pennsylvania, Florida, North Carolina and Minnesota, 1918; Arizona, California, Colorado, Connecticut, Georgia, Idaho, Indiana, Kentucky, Michigan, Missouri, Nebraska, New Mexico, Rhode Island, South Carolina, Texas, Utah, Virginia, West Virginia and Wisconsin in 1919; and, Maine, Alabama and Mississippi in 1920. Dr. Rude says that in Colorado, New Mexico and Utah the division is under the Department of Education, and in Idaho and Nebraska under the department of Public Welfare.

Organization of Nurses Relief. W. C. White[8] says that 85 per cent. of tuberculosis must always be cared for at home. In such care the public health nurse is at least 60 per cent. of the machinery for relief.

For every 250,000 population in the poorer districts we need twenty visiting nurses, one dispensary with four or more sub-stations, hospital beds equal to the mortality rate, five physicians, five consulting nurses and a sanitary and administrative office.

This organization should be in close touch with child and maternity welfare. At least 5 per cent. of any housing program should be so arranged as to isolate and care for tuberculosis patients in a household.

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(7) Amer. Jour. Pub. Health, October, 1920.
(8) Lancet, Oct. 25, 1919.

GENERAL SANITATION AND HYGIENE

Polluted Water Supply in Hartford. C. M. White[9] recites the following story as to the cause of polluted water in Hartford, Conn.:

Finding samples drawn from the city mains repeatedly bad, he set out to find the cause. The water as it came into the mains was good. By tapping at various places the seat of trouble was finally located in a large manufacturing establishment in the heart of the city. It was found that this concern drew water from deep wells on their grounds and used it for a supplemental water supply. It was separated from the city water by six double-check valves. Whether these had leaked or not or whether they were occasionally left open is a hard question to determine, but it is significant that a hair-dressing parlor located nearby had complained of the hardness of the city water. The water from these deep wells was ten times as hard as the city water. The pollution was checked before any disease resulted.

Saville in discussing accessory water supplies says that if the public supply of good water is ample manufacturing plants can meet the requirements of the underwriter by storing city water in underground cisterns and overheard tanks. The insurance companies accept such supplies as ample and demand no increase in rates. It is a question what can be done in a city with a scanty public pure water supply. When the double-check valve was brought out ten years ago it was thought the trouble was solved. Such double-check valves should have a pressure test inspection once a week and a thorough inspection three times a year. But proof is accumulating that the device can not be trusted. He says: "It is now unequivocally condemned."

Well Pollution and Typhoid at Lansing. Most of us assume that wells 400 feet deep furnish water that is safe to drink. This assumption is warranted under ordinary circumstances but not under all. E. D. Rich[1] reports conditions which arose in Lansing, Michigan, and which caused an epidemic of dysentery and typhoid

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(9) Amer. Jour. Pub. Health, September, 1920.
(1) Ibid., February, 1920.

fever beginning March 18, 1919, and lasting until March 29. During this period of gross pollution lasting about two weeks at least 3,000 people were infected with dysentery and eighty-two with typhoid, of which last disease, eleven died.

In the Olds Motor Works the course of the epidemic is indicated by the accompanying table:

Date	Men absent	Output cars
March 19	171	138
March 20	418	88
March 21	1703	19
March 22	2100 shut down	0
March 23	Sunday	0
March 24	486	104
March 25	413	137
March 26	395	123

Normal production, 150 cars. Loss in wages $30,000.

The Reo Motor Company reports average number of men sick and absent 150 a day. Loss of wages, $15,000. Loss to company, $40,000.

These deep wells were driven down to rock and were fairly well cased. In all probability some of those put down years ago were somewhat carelessly installed. Due to the very rapid growth of Lansing, the neighboring streams and even the soil have become rather heavily polluted. The demand for water has made it necessary to pump the wells hard and to create a considerable vacuum. Some of the wells are old and worn. Some old wells leading deep into the soil have been abandoned without being tightly corked. On March 12, heavy rains caused a flood in the Grand River and sewers emptying into that stream were under considerable pressure. This caused an excessive amount of sewage to escape into the soil. Some of this found its way into old well shafts and deep in the soil. The considerable vacuum produced by the pumping drew this into the water-bearing rocks and thence into the wells. Chlorinating the water cured the difficulty.

Atmospheric Pollution. The Fifth Annual report of the Committee for the Investigation of Atmospheric Pollution[2] tabulates the results of uniform investigations

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(2) Rep. Advisory Com. on Atmospheric Pollution, Lancet, Nov. 15, 1919.

of air pollution at twenty-seven stations. Nine of these were located in Glasgow, eight in London, three in Manchester, two in Southport and the remaining six in various parts of Great Britain.

This coöperative committee has been at work for a number of years and the amount of data collected is incomparable. For collecting the impurities of the air they make use of a standard gauge described in earlier reports. This consists of a cast-iron vessel lined with vitreous enamel and has an area of 4 square feet. In all of the stations except Malvern, which is located in the country, it was found that the basin had lost its bright glazed surface due to the acidity of the sediment.

The committee reported on an automatic registering device for recording the amount of air pollution in 1918. The 1919 report says they have gone no further in testing out this apparatus. In the 1919 issue they report on a specially designed tintometer.

The special subjects for investigation suggested for 1919-20 were: The degree of acidity (and in some cases alkalinity) of the air and its sediments, the vertical distribution of impurities, relationship between bacterial impurities and smoke contents, pollution by motor as compared with horse traffic, microscopic examination as to suspended impurities, size of particles and distance carried, selective action of rain and snow in bringing down impurities, effect of suspended impurities on light.

On the second of these points the investigations made in 1918-19 showed no difference in the amount of suspended impurities at the ground level, 80 feet, and 200 feet above the ground level.

In the introduction the committee says: "The health of the community is probably its most important asset. It is to be hoped that the purification of the air we have to breathe will be regarded by the new ministry as one at least of their most important duties. It should be very much to the advantage of the health resorts to be able to show that the air is not polluted. There are doubtless many cities which suffer from impurities in the air which have their source in neighboring cities and which are carried by the wind."

Tubercle Bacilli in Dust. A disquieting report as to the viability of tubercle bacilli is that of J. B. Rogers.[3] Rogers collected dust from the floor of a ward occupied by advanced cases of tuberculosis, treated it with 2 per cent. sterile NAOH solution, incubated it for twenty minutes, centrifugalized the liquid and injected the sediment into eleven guinea-pigs; four developed tuberculosis. Dust from the morgue floor was treated in the same way and injected into four pigs; three developed generalized tuberculosis. Ten pigs were kept in cages where they were compelled to inhale dust when the morgue floor was swept; seven showed tuberculosis. These floors are kept clean or more than ordinarily so. They are mopped daily with a strong antiseptic solution. Rogers holds that living tubercle bacilli in dust material can withstand drying and the effect of diffuse light and still retain their virulence.

Legal Decision Based on the Presence of Flies. B. Bristol[4] reports that the Maine Supreme Court has ruled that an abundance of flies in a hotel is a valid excuse for breaking a contract. F. A. Sweet contracted for board for himself and family for two weeks at a hotel run by F. A. Williams. The flies were so abundant that he moved from the hotel. Williams sued for the board bill and Sweet offered proof of the over-abundance of flies as his defense. Judge Spear in giving a verdict for Sweet said: "It is a matter of common knowledge that the house fly has come to be regarded by enlightened understanding not only as one of the most annoying and repulsive of insects but as one of the most dangerous in its capacity to gather, carry and disseminate the germs of disease."

Sulphur Dioxide in the Air as a Preventive of Consumption. F. Tweddell[5] tabulates the replies from thirty-eight large concerns making or using sulphur dioxide in large quantities. He sent each of these concerns a letter asking as to how many cases of consumption it had had among its employees and the course of the disease. The aggregate number of employees was

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(3) Amer. Jour. Pub. Health, April, 1920.
(4) Maine Health News Bull., August, 1920.
(5) Med. Record, Aug. 21, 1920.

11,085, 7,702 of whom were habitually exposed to SO_2 fumes in some strength. The average length of time reported on was twelve years. The number of cases of consumption was twenty-two. Of these seven persons had and two were suspected of having the diseases. Perhaps not more than thirteen cases of consumption developed in the 11,085 men in twelve years.

Some consumptive patients seemed to get well when they inhaled the SO_2 air. Consumption appeared to run a slowly progressive course. The owners, managers and men seemed to think breathing air which contained a small amount of SO_2 served to protect against influenza, consumption and other infections of the respiratory tract.

Sterilizing Air by Electricity. d'Arsonville[6] submitted air polluted with mineral dust and seeded with *Micrococcus prodigiosus* to a current of 50,000 volts. This air was found to be sterile. Neighboring atmosphere showed a mean bacterial count of 150 colonies per cubic meter.

Rural Health Work. L. L. Lumsden[7] summarizes the results of the rural health work done in the fiscal year ending June, 1920, by the U. S. Public Health Service.

In 1916 when this work began study indicated: (1) in less than 2 per cent. of the rural homes were the most essential principles of sanitation consistently in practice; (2) for less than 3 per cent. of the rural population was adequate local health service established.

In the year ending June, 1920, with an appropriation of $50,000 the following work was done:

(*a*) Lectures to 83,000 people.

(*b*) Sanitary inspection of 150,000 homes with explanatory talks with members of the household.

(*c*) Examination of 45,000 school children of whom 276,131 were found to be in need of attention.

(*d*) In cases of communicable diseases, 872 home visits made by nurses.

(*e*) 670 visits to expectant mothers.

(*f*) 5,428 home visits for infant welfare purposes.

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(6) Rev. Sci., March, 1920.
(7) Public Health Rep., Oct. 1, 1920.

(*g*) 19,370 vaccinations against smallpox.
(*h*) 21,203 treatments in cases of venereal diseases.
(*i*) 4,151 cases of communicable disease quarantined.
(*j*) 16,250 sanitary privies installed.
(*k*) 1,178 homes provided with a sanitary water supply.
(*l*) Radical improvement of 494 public milk supplies.

The Federal appropriation for this work was $50,000.

Control of Privies. North Carolina has a privy licensing law which provides a license fee of 40 cents a year for all privies located on premises on which there are residences within 300 feet of other residences. The law provides for an inspection by the state board of health and the placarding of the privy with a tin license tag if approved or with a license pending tag or with a tag reading "Insanitary. Unlawful to use after ....." The last group pays no license.

According to K. E. Miller[8] the state board of health approves and licenses five types of privies. In practice the law operates to cause many towns and cities to get almost 100 per cent. connections with sewers. There is an epidemic of sewer and privy building. The board of health furnishes the privy and sewer contractors all the aid they legitimately can in their efforts to persuade people to build sanitary privies. In mill towns the superintendent takes charge of the operation of the law. The law plainly does not cover rural privies. There are said to be 100,000 privies coming under the law and it is hoped the $40,000 collected from licenses will pay for the cost of inspection and licensing. The law is very popular.

Control of Bathing Pools. Not believing in the bacterial count as a sole index of purity in bathing pools and also thinking Gage's weekly bathing load an insufficient index, G. M. Fair[9] proposes a score card for swimming pools. To get the bathing load he divides the weekly attendance by the number of thousands of gallons of water the pool contains. To get the index of contamination he divides the number of bathers using

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(8) Southern Med. Jour., October, 1920.
(9) Amer. Jour. Pub. Health, June, 1920.

the pool in a given time by the number of thousand gallons of water. To get the index of stagnation divide the number of bathers by the amount of filtered water in thousands of gallons.

A pool of 50,000 gallons with a weekly attendance of 1,200 bathers, the water in the pool being uniformly recirculated and disinfected for eight hours at the rate of three turnovers or 150,000 gallons, would give the following values on this score card:

Weekly bathing load	24
Weekly index of stagnation	4
Weekly index of contamination	4
Daily bathing load	4
Daily index of stagnation	4
Daily index of contamination	4
Hourly bathing load	.05
Hourly index of stagnation	4
Hourly index of contamination	4

Cats in the Spread of Diphtheria. Dr. W. G. Savage[1] proves by very extensive laboratory and animal experiments that cats are not factors of importance in the spread of diphtheria.

[J. S. Simmons, of the Walter Reid Hospital, reports several cases of diphtheria in cats associated with diphtheria in human contacts.—Ed.]

Rat Control. F. N. White[2] says that in England the *Rattus norwegicus* or brown rat has about driven out the *Rattus rattus* or black rat. In India the prevailing rat is the black rat. Rat campaigns which do not take into account the habits of the rats operated against are ineffective. The best rat poisons are made with fresh dough bait composed of the food preferred by the particular rats being campaigned against. In a rice region rice dough is best, in a corn region corn dough and so on. The addition of cheese, fats, butter and other unusual foods was of no service in White's experience.

Barium carbonate is the best rat poison. Mix one pound of barium carbonate with three pounds of flour made from the staple grain of the neighborhood. Add sufficient water to make a fairly firm paste. This is

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(1) Jour. Hygiene, February, 1920.
(2) Brit. Med. Jour., Nov. 15, 1919.

enough to make 2,300 baits each containing 3 grains of poison. Clean hands and clean utensils are requisites.

Measures for Rat Repression. W. Hanna[3] values various rat repressive measures about as follows:

Bacterial viruses and poisons have many disadvantages. Not much can be said in favor of their use on a large scale. The bacterial viruses are especially impotent. Trapping gives fair results. Bird lime traps will sometimes catch where other traps fail. Fumigation with liquid SO_2 gas in small cylinders and with carbon sulphide is effective on shipboard. The most effective methods are rat-proofing and the removal and destruction of garbage.

M. A. C. Hinton[5] sees no gain from localized rat catching and rat killing efforts. Those left behind will breed more rapidly and quickly bring the numbers back to the old level. For local destruction of rats he favors the Rodier plan. This plan consists in catching the rats alive, killing the females and releasing the males. Presently the over-supply of males will be very great and they will harrow the females and lessen breeding, will kill the young and eat up the food supply. He advocates rat-proofing.

Rat Fleas. A. W. Bacot[6] says that thirty-five varieties of fleas have been found on rats. Of these nine have been known to bite man. How many of these are capable of transmitting plague remains to be seen. Where a flea takes blood containing plague bacilli the organisms multiply in the intestinal tract and finally completely stop it. When this condition arises the flea may starve to death. While the tract is plugged with bacilli the insect is ravenously hungry and bites much more frequently than is normal. Since the food can not pass it becomes infected with bacilli and is regurgitated into the tissues of the animals being bitten. Bacot confirms the observations made elsewhere of a relation between atmospheric humidity and temperature and the prevalence of fleas and flea-borne diseases.

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(3) Jour. Royal Sanit. Instit., September, 1919.
(5) Ibid.
(6) Ibid.

Microörganisms Carried by Rats. A. G. R. Foulerton[7] found that 36.6 per cent. of rats caught in London were infected with *Trypanosoma lewisi.* In another series about 3 per cent. were infected with *Spirillum icterohemorrhagiae,* the organism causing Weil's disease, or infectious jaundice in man. A certain percentage are infected with *Spirillum morsus muris,* the organism responsible for rat-bite fever. About 5 per cent. of rats examined are affected by rat tuberculosis. Rats serve as a reservoir for plague keeping the disease going during the winter and other adverse seasons. There is considerable evidence that the rat is an important vector of *Trichina spiralis.*

Body Lice. Chavigny[8] says that no one who does not sleep in his or her underwear will suffer from body lice. The louse spreads typhus fever, recurrent typhus and trench fever. Lice were carried into the army by persons low in the social scale. They stay in the clothing and they go on the body only for the purpose of feeding. Since the eggs are laid exclusively in the seams of the underwear if the underwear is put in hot water at 50°C. for twenty-five minutes all eggs will be killed. The adult body louse will stand hot water (at 50°C. for 30 minutes; from 100° to 110°C. dry heat will kill. Chilling during the night such as occurs when the underwear is removed and exposed to the cold is destructive in time to both body lice and their eggs.

Chavigny concludes with the following remarks: Body lice live only on people who do not change their underwear. Its eggs are hatched only by persons who sleep in their underwear. All persons who will avoid these two causes of multiplication of lice can be assured of restful sleep and freedom from the diseases borne by lice.

Hygiene and Sanitation in France. P. Bonnette[1] says that, thanks to vaccination, typhoid fever was banished during the war in spite of the promiscuity of races which during four years transformed France into a tower of Babel, in spite of the fecal peril at the front

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(7) Jour. Sanit. Instit., September, 1919.
(8) Ann. d'hyg. pul. et de méd. legale, July, 1919.
(1) Presse méd., July 14, 1920.

and the constant pollution by excretion. The army lived on a fecaloid block which the shells of the enemy constantly stirred up. Without hygiene and typhoid vaccination the army would have been destroyed by the typhoid bacillus even more surely than by the shells and asphyxiating gas of the enemy (Fig. 25).

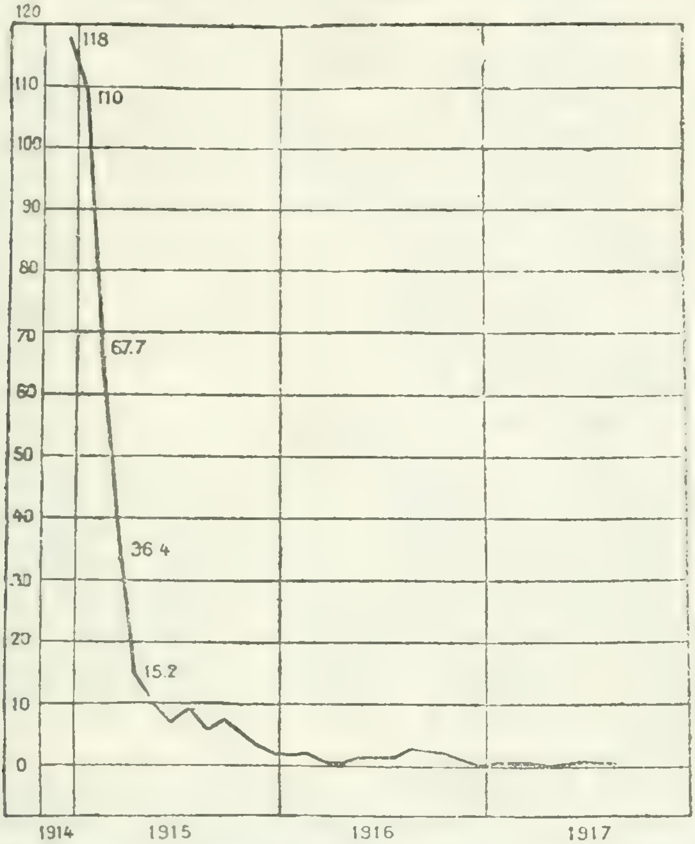

Fig. 25. Mortality curve of typhoid and paratyphoid for the years 1914-1917.

Contrary to the history of the past, deaths due to disease have been much inferior in number to deaths from wounds. The eruptive fevers, measles and scarlet fever have not been more frequent than in time of peace or their complications more grave. Mumps has been rarely epidemic. According to Louis Martin, during the five years of the war the army of the interior has had only 15,271 cases of diphtheria with 378 deaths or a mortality of 2.4 per cent. In the zone of the armies there were 114,233 cases of diphtheria with 229 cases or a case mortality of 2 per cent.

The nasopharynx of carriers has been disinfected with the dried serum or pastilles of Martin. It is easily applied and successful. The formulas of Ravant and of Le Groux have also been successfully employed.

Cerebrospinal meningitis was not more contagious than in times of peace. The nose in carriers was sterilized by vaporizing a mixture of iodine and guiacol called Vincent's solution. The liquid is placed in a small bottle and this is plunged in very hot water. The liquid throws off fumes, which is inhaled through the nose for two or three minutes about five times a day.

To combat dysentery Dopter's serum and emetine have been used effectually.

Smallpox was conquered by vaccination. During the five years there were only twenty cases, as compared with 10,000 in 1870-71.

French soil was not invaded by cholera, plague or typhus.

Birth Control in France. The national alliance for the repopulation of France[2] says that in France in 1918 there were 400,000 births as against 800,000 deaths not counting deaths of soldiers. One of the great causes of the low birth rate is abortions. Of these there are hundreds of thousands each year. The number of convictions for abortion is about a dozen. The Cazenenoe law is advocated.

Contagion in Germany. Before the world war, says E. Arnould,[3] the Germans were very well satisfied with their success in curbing contagion but not so now. Between 1883 and 1913 the tuberculosis death rate was reduced from 320 to 137. This rate has increased 50 per cent. and in 1918 reached that of 1886. The number of deaths was increased 2,000 in 1914, 5,000 in 1915, 10,000 in 1916, 27,000 in 1917. The increase in the cities was 60 per cent.; in the rural districts 40 per cent.

In Austria there were 23,000 cases of smallpox in 1915.

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(2) Presse méd., Mar. 31, 1920.
(3) Ibid., June 5, 1920.

In Germany there were 150 cases in 1914 and also in 1915. An epidemic started in March and there were 400 cases by the end of 1916. In the first half of 1917 there were 2,210 cases of which 500 were in Berlin. In the second half of 1917 and the first eleven months of 1918 the rate was normal. In December, 1918, there began an epidemic in Saxony, Silesia, Eastern and Western Prussia which had resulted in 1,300 cases by the end of March, 1919, and which was not wholly under control in July, 1919.

Typhus fever got a fine foothold during the war but it had been brought under control by the end of 1919.

Malaria has established good footholds in High Silesia and Eastern Prussia. Cholera got into Berlin in September, 1918. At the time this was written it appeared that conditions were approaching normal.

Sanitation in Poland. It would be difficult to imagine a more gloomy picture than that which F. E. Fronczak[4] portrays in his recital of the medical aspects of the war in Poland. The Polish people have always had high death rates and, fortunately, high birth rates as an offset. When other nations were learning the laws of sanitation and profiting therefrom in the way of lower death rates Poland, split into three parts, was under the dominion of countries not interested in the progress of the Polish people. With the advent of the war they were compelled to fight in the warring armies and a good part of Poland was fought over. When they organized their own government in 1918 they provided for a department of health coördinate with other departments of government but Poland has had no chance to stop fighting and the want and misery of the people has not abated.

Before the war, public health work was neglected or there was none, the water supplies were polluted and the sewage was not disposed of. In 1913 there were tuberculosis death rates of 489,208 and 389 in certain cities. Some baby death rates were 155, 190 and 205. The birth rates in Prussian Poland, 33.7, Poland, 37.2, Austrian-Poland, 40.6.

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(4) N. Y. Med. Jour., Jan. 10, 1920.

In 1919 the conditions were fearful. Hunger edema was everywhere. Children were undernourished, underweight and undersized. Thousands were dying from typhoid, dysentery, typhus, smallpox and cholera. In 1918 there were 250,000 cases of typhus. In Kracow in 1919 the tuberculosis rate was 901 per 100,000. The infant mortality rate 400 per 1,000 births. The birth rate had fallen from 40 to 19.7 per 1,000. In Zyardow the infant mortality rate was 80.2 in 1913 and 45.31 in 1917. In Minsk the baby death rate was 512 and in Dobrzyn 422. In Warsaw there were 11,203 cases of typhus in ten months in 1918.

Incubation Periods of Contagion. The New York State Board of Health[5] has established the following maximum incubation periods:

Chickenpox	21 days
Measles	14 days
Mumps	21 days
Poliomyelitis	14 days
Scarlet fever	7 days
Smallpox	20 days
Whooping cough	14 days

They have also formulated the following rules which relate to isolation periods:

Chickenpox: Until twelve days after the appearance of the eruption and until the crusts have fallen and the scars are completely healed.

Diphtheria (membranous croup): Until two successive negative cultures have been obtained from the nose and throat at intervals of not less than twenty-four hours, the first of such cultures being taken not less than nine days from the day of the onset of the disease.

Epidemic cerebrospinal meningitis: Until two weeks after the temperature has become normal or until three successive cultures, obtained from the nasopharynx at intervals of not less than five days, shall be found free of meningococci.

Measles: Until at least five days after the appearance of the rash.

Mumps: Until two weeks after the appearance of the

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(5) Buffalo Sanitary Bull., Sept. 30, 1920.

disease and one week after the disappearance of the swelling.

Poliomyelitis, acute anterior (infantile paralysis): Until three weeks from the day of the onset of the disease.

Scarlet fever: Until thirty days after the development of the disease and until all discharges from the nose, ears and throat, or suppurating glands have ceased.

Smallpox: Until fourteen days after the development of the disease and until scabs have all separated and the scars completely healed.

Typhoid or para-typhoid fever: If the patient's occupation involves the handling of milk, dairy products, or other food, until all signs of the disease, or all secondary or complicating infections incited by the agents of these diseases, have disappeared, and until two successive specimens of the intestinal discharges of the patient have been taken at an interval of not less than seven days and have been examined in a laboratory approved by the state commissioner of health and found to be free from typhoid or para-typhoid bacilli.

Whooping cough: Until eight weeks after the development of the disease or until one week after the last characteristic cough.

Keeping Smallpox Vaccine. Public Health Reports[6] says that there is no danger of keeping vaccine virus too cold. If the percentage of takes is high it must be kept not far above the freezing point of water. Even when kept well, virus does not remain potent much more than two months from the date of manufacture during the period May 1 to September 15, and not longer than three months during the remainder of the year.

Keeping Smallpox Vaccine in Hot Climates. That smallpox vaccine rapidly becomes inert in warm weather has long been a well-known fact. Some of the effort to overcome this short-coming is told by J. Enterican[7] who is connected with the Burma vaccine depot.

By strict attention to detail the percentage of positive takes with the vaccine has risen from 87 to 97. In India vaccination is carried on in summer as well as

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(6) July 23, 1920.

(7) Indian Med. Gaz., March, 1920.

winter and this requires extra care with the vaccine. Efforts to find a substitute for glycerine have failed. Lanoline medium does not kill off the other bacteria present as does glycerine. Occasionally lanoline develops acid, and vaccine virus speedily becomes inert in an acid medium. The evidence that lanoline virus remains potent longer than glycerine virus is not good. Suspensions in a watery solution of quinine and in mucilage were not satisfactory. The best method of ridding vaccine of bacteria, a procedure necessary both to prevent bad arms and to protect the vaccine from becoming inert, is by storing for several months at a temperature below freezing. The objection to bubbling chloroform through the virus for this purpose is that it lowers the longevity of the lymph. Turpentine, kerosene, petrol, ether, oil of cloves, citronella, eucalyptus, cinnamon, formalin, ether, methyl and amyl alcohol were none equal to storing at low temperature. Amyl alcohol and oil of cloves were the better.

To determine how long vaccine remained potent under the difficult conditions in India a series of experiments was made. These showed that in two weeks vaccine had materially deteriorated in hot weather. Many samples had deteriorated in three weeks and few survived four weeks. In cooler weather vaccine remained potent longer, occasionally as long as four months. Among the causes of deterioration are—action of glycerine, presence of bacteria, acidity, high temperatures, atmospheric action and direct sunlight.

There is no advantage in putting up vaccine in leaden tubes. If properly made with glycerine, kept cold and in the dark all is done that can be.

Hay Fever Resorts. Dr. W. Scheppegrell[8] gives a list of hay fever resorts in the United States as reported to him by the state health departments:

ALABAMA: The towns along Mobile Bay. The following counties also, Etowah, Marshall, Cherokee, Blount, Morgan, Colbert, Marion, Talladega, Shelby, Clay and Randolph.

ARIZONA: None.

ARKANSAS: Eureka Springs, Heber Springs, Sylvan Springs and Winslow.

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(8) Pub. Health Rep., Sept. 24, 1920.

CALIFORNIA: Santa Cruz, Del Monte, Santa Barbara, Coronado and points in the high Sierras.

COLORADO: Places located at altitudes of more than 7,000 feet.

CONNECTICUT: The Litchfield Hills and the New London district.

DELAWARE: None.

DISTRICT OF COLUMBIA: None.

FLORIDA: The coast of southern Florida.

GEORGIA: Brasstown, Bald Mountain.

IDAHO: No resorts.

ILLINOIS: No resorts.

INDIANA: No resorts.

IOWA: No resorts.

KANSAS: No resorts.

KENTUCKY: No resorts.

LOUISIANA: Covington, Abita Springs and Magnolia afford relief in the spring type of hay fever.

MAINE: Rangeley Lakes and Kineo.

MARYLAND: No resorts.

MASSACHUSETTS: No resorts.

MICHIGAN: The northern part.

MINNESOTA: Duluth.

MISSISSIPPI: No resorts.

MISSOURI: No resorts.

MONTANA: No resorts.

NEBRASKA: The western part of the state.

NEVADA: No resorts.

NEW HAMPSHIRE: No resorts reported.

NEW JERSEY: Ocean County.

NEW MEXICO: Cloudcroft, Whitcom Springs, Albuquerque, Valley Ranch, Glorietta, Jenner Springs, Sulphur Springs, El Porvenir and East Las Vegas.

NEW YORK: The Adirondacks, Fire Island, Thousand Islands, Big Moose, Old Forge Lake.

NORTH CAROLINA: Eagles' Nest, Glen Ayre, Blackstock Knob, Black Dome, Mount Gibbs, Hall Back, Mount Mitchell, Double Springs, Richland, Balsam, Jones Knob, Mount Buckley, Clingman's Drive, Mount Love and Alexander.

NORTH DAKOTA: Devil's Lake.

OHIO: None.

OKLAHOMA: None.

OREGON: None.

PENNSYLVANIA: Eaglesmere, Pocono Mountains, the vicinity of Bradford, the vicinity of Mont Alto and Caledonia.

RHODE ISLAND: None.

SOUTH CAROLINA: Caesar's Head.

SOUTH DAKOTA: Hot Springs.

TENNESSEE: Roan Mountain.

TEXAS: None.

UTAH: Places at an altitude of more than 6,000 feet and certain canyons, such as Brighton and Weber near Ogden.

VERMONT: Green Mountains.

VIRGINIA: None.
WASHINGTON: **West of the Cascade Range.**
WEST VIRGINIA: Terra Alta, Martinton, Webster Springs.
WISCONSIN: Two Rivers.
WYOMING: None.

The report also gives the period of onset of spring and autumn hay fever in each state and a list of the hay-fever producing plants found in abundance in each state. The list of plants was furnished by the U. S. Department of Agriculture. The date of onset of hay-fever was furnished by prominent rhinologists.

LABORATORY METHODS

Culture Media. J. W. H. Eyre[9] and his associates acting as a sub-committee of the committee on standardization of routine pathologic methods make a report on the reaction of media which should be on the desk of every laboratory technician. The committee holds that the method of titrating acidity and alkalinity of media employed by laboratories gives results which are necessarily fallacious. The method which they propose is one by which the hydrogen or hydroxyl-ions are determined.

Culture Medium for B. Coli. To eliminate some of the errors in making the presumptive test for *B. coli* T. C. Miner and R. L. Harris[1] make use of the following culture medium:

Distilled water	1,000
Dried ox-gall	50
Peptone	10
Lactose	10
Brilliant green	0.1

Heat water to a boil. Dissolve the ox-gall and peptone. Boil one hour. Remove from flame and add lactose. Filter through cotton flannel until clear. To each liter add 10 c.c. of a 1 per cent. solution of brilliant green. Place in tubes and sterilize for 15 minutes under 15

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(9) Special Rep., Series No. 35, Med. Res. Com., Nat. Health Insur., 1919.

(1) Amer. Jour. Pub. Health, November, 1920.

pounds pressure. Cultures growing in this and producing gas freely were practically all *B. coli.*

B. Coli and B. Aërogenes. H. W. Clark[2] suggests that *B. aërogenes* is merely a degenerate *B. coli* living under adverse conditions. It is much more hardy than *B. coli* members of the group. In fifty cultures made from sewage 22 per cent. were *B. aërogenes.* In 80 cultures from Merrimack River water 34 per cent. were *B. aërogenes.* Of fifty-five cultures from filtered river water 31 per cent. were *B. aërogenes.* Of 3100 coli like cultures from human feces only 6 per cent. were *B. aërogenes.* In another series of 1104 cultures from feces only 3 per cent. were *B. aërogenes.*

The two organisms are of different sanitary significance. *B. coli* is undoubtedly of fecal origin while *B. aërogenes* is not. To differentiate the two groups the methylene red test is used. The production of a red color in the medium to which a few drops of methylene red has been added indicates *B. coli;* if a yellow color, *B. aërogenes.* If, instead of methylene red a volume of 10 per cent. KOH equal to the volume of culture media is added an eosin pink color is developed on standing if *B. aërogenes* is present. The medium on which the organism is grown contains dextrose with peptone and dipotassium hydrogen phosphate. In this medium *B. aërogenes* forms more CO_2 and less hydrogen and acid than does *B. coli.* The medium should contain 6 per cent. peptone instead of the 5 per cent. required by standard methods.

Gas-Producing Bacilli of Water. M. Levine[3] continues his contributions to the differentiation of gas-producing bacteria found in water. In this study he finds that 10 per cent. or more of gas in 24 hours is a reliable index to *B. coli* in raw but not in treated waters. The presence of less than 10 per cent. gas in untreated waters is a fair index to *B. coli.* It is not an index in treated waters. A small amount of gas in twenty-four hours is a more reliable index than a large amount in forty-eight hours. He used eosin methylen blue agar to

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(2) Commonwealth, May-June, 1920.

(3) Jour. Amer. Waterwork Ass'n., March, 1920.

differentiate presumptive *B. coli* from *B. aërogenes.* In ground waters *B. aërogenes* is as significant as *B. coli.* In stored surface or treated waters *B. aërogenes* alone is of little significance.

Differentiating Virulent Diphtheria Bacilli. Another effort to differentiate diphtheria bacilli into virulent and non-virulent by means of their staining reactions is that of H. Albert.[4] Making use of his toluidin-blue-iodine stain[5] he classifies diphtheria bacilli into:

G1—Granular, short.
G2—Granular, medium.
G3—Granular, long.
G4—Granular, clubshaped.

B1—Barred, short.
B2—Barred, medium.
B3—Barred, long.
B4—Barred, clubshaped.

He found that bacilli containing no granules when stained by his method were always non-virulent. Some non-virulent forms, however, contained granules. His method of staining showed granules in many bacilli which appeared solid when stained by the Löffler methylene-blue method.

Sterilization of Sputum Containing Tubercle Bacilli. Struck by the contradictions in the text-book statements as to the strength of disinfectants required to kill tubercle bacilli in sputum W. R. Stokes and C. H. Douthert[6] undertook a line of experiments by which they were led to believe that the addition of an agent to dissolve the mucus and permit the disinfectant to get at the bacilli was of more consequence than was the strength of the disinfectant itself. The addition of 1 per cent. caustic soda made it possible for phenol and cresol solutions to kill bacilli when the actual strength of the disinfectant was no more than 0.5 per cent. This suggests that liquor cresolis compound should prove highly effective because it contains both alkali and cresol. A solution of 1 per cent. cresol or phenol containing 1 per cent. caustic soda is recommended for sterilizing containers in which sputum for tubercle bacilli, pneumococci and influenza bacilli are shipped through the mails.

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(4) Amer. Jour. Pub. Health, December, 1920.
(5) Jour. Amer. Med. Ass'n., Jan. 3, 1920.
(6) Amer. Jour. Pub. Health, December, 1920.

VITAL STATISTICS

Birth and Death Rates. That the loss of potential lives through the falling birth frequency has been numerically greater than the actual loss of life in battle is the opinion of K. Stonman.[7] In France in 1916 the birth rate was 9.4 whereas the death rate was 18.1. In Belgium in 1917 the birth rate was 11.3. However, in every year the birth rate was slightly in excess of the death rate, which was not true in France.

Influenza was more fatal in Italy than in any other country. Spain was second in this particular. The excess of the 1918 death rate over that of 1917 was about the same in European countries except in Switzerland and France where it was somewhat higher and in Scotland and Ireland where it was lower. In Denmark there was no increase at all. This was probably due to a phenomenally low death rate earlier in the year which the prevalence of influenza in the last quarter of the year just about overcame.

Influenza and Other Statistics. The most pessimistic note as to the efficacy of public health administrative work which has come from any source in recent years is that of Raymond Pearl.[8] Karl Pearson, in 1918, said that the rapid fall in the tuberculosis death rate which began in 1865 and extended to 1895 shaded off so palpably that somewhere about 1915 all fall would cease and that by 1920 we would see that the average rate for a series of years was higher than that of 1915. Pearson attributes greater results to general improvements in social hygiene than to specific efforts to combat tuberculosis or the tubercle bacillus.

Pearl says that W. T. Howard has made a study of tuberculosis in Baltimore during the past ninety years and comes to substantially the same conclusions. In 1917, according to Pearl, cities of 30,000 and over in the United States expended something over 120 million dollars in promoting and safeguarding public health. This represents an expenditure of $4 *per capita,* and is the interest on two and a half billion dollars. This has re-

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(7) Internat. Jour. Pub. Health, July, 1920.
(8) Jour. Amer. Med. Ass'n., Feb. 7, 1920.

turned very little for the expenditure, largely because those in administrative control are too intent upon bacteriology and know too little about biology. The biologists themselves are to blame because they have not made their views more impressive.

The only four diseases the prevalence of which have been materially lessened are smallpox, typhoid fever, yellow fever and malaria.

The most interesting detail of Pearl's paper relates to his studies of influenza.[9] Studying the progress of the epidemic in forty large American cities he found a most remarkable variation between the progress curves of the disease, especially as to the explosiveness of the outbreaks. He says unpublished observations on the restrictive and repressive measures used in various communities such as prevention of public gatherings and compulsory wearing of masks show that none of these measures had the slightest influence on the course or the severity of the epidemic. An analysis of the facts relative to geographic location, age, constitution of the population, density of population, and rapidity of growth of population in recent years showed immediately and conclusively that these factors had absolutely nothing to do with the course or severity of the epidemic.

When he turned to the normal death rates of the communities under study he found order coming from chaos. Communities with high death rates had high influenza death rates. Further studies showed that the explosiveness of the influenza epidemic was correllated with the three great causes of death, namely—tuberculosis of the lungs, organic disease of the heart and Bright's disease. The total mortality from influenza was high in those communities in which the death rate from these three organic groups of diseases—lung disease, heart disease and kidney disease—were high. Communities in some degree organically unsound as indicated by relatively high normal death rates from phthisis, organic heart disease and nephritis were less liable to meet successfully the attack of a vicious epidemic invader than

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(9) Public Health Rep., Aug. 8, 1919.

were those in which these biologic conditions did not exist.

Care of Young Babies. In England and Wales in 1917, 64,483 babies under one year of age died. According to Sir Arthur Newsholme[1] the number of deaths in the second year was 20,296; in the third, 9,724; in the fourth, 6,025; while in the fifth it was only 4,439. This high infant mortality rate must be and is being lowered but the great improvement is in the last eleven months of the period. The most fertile and the least tilled soil is that of the first year.

Ninety per cent. of the deaths from premature birth and 40 per cent. of those from atrophy, debility and marasmus occur in the first month after birth. The infant mortality rate of England and Wales is 120.4 per 1,000 births. Of this, 24.3 occurs in the first week of life and 40.3 in the first month. But the death rate in the first week and in the first month of life is very different in the different counties. It runs 18.2 in Hereford to 33.8 in Durham. The mortality under 1 month varies from 30.6 in Oxford to 52.1 in Durham. In towns the under 1 month rate varies from 16.9 in Heywood to 41.4 in Workington and the under 1 month from 25.9 in Watford to 61 in Workington.

These differences mean to Newsholme that the rate can be lowered. Closer study shows that it varies even more among different groups in the same county. All this means that much is due to removable causes. T. H. C. Stevenson's figures show that 25 per cent. of the total births occur under circumstances involving a sacrifice during the first month after birth of nearly 50 per 1,000 of the babies born; while for over 2 per cent. of the births the sacrifice was only 20 per 1,000 births. All these facts argue that the infant mortality of the early weeks is largely preventable. Infants do not start fair at birth. Stevenson has shown that the death rate from syphilis is eight times as high among illegitimate as among legitimate babies.

The still-birth rate in England varies from 3 to 8 per 100 living births. One way of lowering the infant mor-

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(1) Lancet, May 22, 1920.

tality rate of the first month of pregnancy will be by giving humane and socially sound care to pregnant unmarried women and to unmarried mothers and their babies. Mother and baby must be kept together for one thing.

One mother dies from puerperal sepsis for every 700 babies born and many others are invalided. However, the death rate from puerperal sepsis has fallen greatly while no other part of the early infant and parturient women mortality rate has.

The distribution of mortality due to pregnancy and parturition is as follows:

Puerperal sepsis	31.7%
Puerperal albuminuria and convulsions	21.6%
Puerperal hemorrhage and other accidents of childbirth	25.5%
Other puerperal conditions	10.4%
Accidents of pregnancy	10.8%

The possibilities for improvement lie along the following lines:

1. Continuity of supervision of women beginning with the early months of pregnancy and continuing through pregnancy and the puerperium.

2. Antenatal and postnatal clinics.

3. Diagnosis and treatment of syphilis during pregnancy.

4. Skilled care during parturition. More infants of viable age die during labor from injury or accidental complications than die from disease during pregnancy. Of 100 dead-born viable foetuses Eardley Holland found that sixty had died recently, probably most of them during labor.

5. Maternity hospitals and homes in the country districts as well as in the city.

6. Highest standards of midwifery.

7. More research as to the causes of death during birth and the first week thereafter.

Whittridge Williams says that 26.4 per cent. of the deaths of fetuses after the seventh month are due to syphilis.

Demography of the English Middle Classes. J. W. Brown, Major Greenwood and Frances Wood[2] conducted a fairly extensive, accurate and detailed statistical inquiry on the fertility of the English middle classes. They found that taking into consideration the lateness of marriage, the resultant shortening of the period of married life between the date of marriage and the onset of the menopause in the female, the fertility of college educated women is not lower than that of women of the same social strata who are not university educated.

The mean size of the family of the middle classes is small, probably not far from three. For instance for each 1,000 marriages 3,000 children can be calculated. What percentage of these reach adult life and marry is a matter for another observation. It was thought that this rate was high enough to maintain the population prior to the onset of the war.

In a percentage distribution of restrictions on fertility among collegiates and non-collegiates the following results were obtained:

	Collegiates	Non-collegiates	Total
Restricted	47.40	39.87	45.58
Non-restricted	32.64	38.56	34.07
Doubtful	19.96	21.57	20.35
	100.00	100.00	100.00

Methods employed for restriction of fertility:

	Collegiates	Non-collegiates	Total
Continence	89	16	105
Coitus interruptus	20	6	26
Sheaths	18	2	20
Pessaries	10	7	17
Douches	13	2	15
Artificial means not specified	19	1	20
Not stated	59	27	86
	228	61	289

Causes of restriction of family:

	Economic	Health	Doubtful	Total
Non-collegiate	28	19	14	
Collegiate	102	71	55	
Total	130	90	69	289

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(2) Eugenics Rev., October, 1920.

FOOD CONTROL

Food Customs in Denmark. If M. Hindhede[3] is accurate and dependable in reporting on food conditions in Denmark during the war we can change our food habits very markedly with benefit to our health and our pocketbooks as well.

The death rate of Copenhagen had been running about 13.5 for a number of years before the war. The average for 1914-15-16-17 was 13.3. The rate Oct. 1, 1917 to Oct. 1, 1918 was 99. Establishing the average for 1900 to 1916 as 100, the death rate of 1917 was 83 and Oct. 1, 1917 to Oct. 1, 1918 was 66. This reduction Hindhede offers as proof that the principal cause of death lies in food and drink. The Danish people lived largely on milk and vegetables. They ate almost no meat and very little fat and drank no brandy and only half the allowance of beer. They not only ate whole rye but they mixed wheat bran with it. They lived principally on bran bread, barley porridge, potatoes, greens, milk and some butter. They doubled their flour supply by milling the rye to 100 per cent. adding barley meal milled to 95 per cent. This gave them a bread in which the percentage used by the human economy was reduced only from 94 to 85 but in which the total bread available was increased more than 100 per cent. The Danish people knew how to make a high grade palatable bread from this flour.

Hindhede thinks our protein requirements are so low that in taking sufficient calories as vegetables, bread and milk we get enough protein. Nor does he consider fats a necessary ingredient of a diet. He thinks Central Europe would not have starved had the people gone on the lacto-vegetarian diet on which the Danish people thrived. He does not agree with Rubner (*Deuchschrift des Reichsgesundheit samtes,* Berlin, 1919) that meat must again form an adequate proportion of our diet. He thinks the people must first have bread, potatoes and cabbage and then some milk. If the people must wait until pigs and cattle have sufficient food they will die of starvation one year before they get meat.

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(3) Jour. Amer. Med. Ass'n., Feb. 7, 1920.

Artificial Vitamines. H. E. Dubin and M. J. Lewi[4] have made an artificial mixed vitamine which they offer as an aid in the treatment and prevention of deficiency diseases. The vitamine product called V. is prepared from autolyzed yeast and orange juice. It contains antineuritic, antirachitic and antiscorbutic vitamines and when the food contains ample food elements it promotes the growth of young animals. The mixture is dried *in vacuo* at a low temperature. It is a grayish white powder practically odorless, slightly sweet and devoid of toxic properties. It is stable, non-hygroscopic, sparingly soluble in water and strong organic acids, much more soluble in dilute acids and gastric juice and practically completely soluble in concentrated mineral acids. Its activity as a vitamine has remained unchanged during five months and should be retained for years. It has been thought best to store the product in the dark.

A tentative analysis shows calcium as calcium oxide 10 per cent., phosphorus 15 per cent., nitrogen 3.5 per cent., fat 2.5 per cent., iron 0.3 per cent., silicates 5.6 per cent., moisture 10 per cent. The remainder is made up of the rest of the phytin molecule which is a double calcium and magnesium salt of mosite pentaphosphoric acid.

Experiments with children, pigeons, and guinea-pigs convince the authors that the product contains the growth principle and is capable of preventing rickets, scurvy and beriberi. The essay contains a review of the literature on vitamines covering the nature of the substances, the proof that they are several in number rather than differing manifestations of the same substance, and their reactions to temperature, drying and light. This literature tends to show that the vitamines stand drying at low temperatures, keep well at low temperatures and keep best when protected from light.

[The subject of nutrition is an important one from the health standpoint. Especially is this true with relation to children. Health departments generally maintain nutrition clinics now. The New York City Health Department has issued cod liver oil as an antirachitic

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(4) Amer. Jour. Med. Sci., February, 1920.

remedy. The Dubin-Lewi artificial permanent mixed vitamine may prove to be a valuable agent for the prevention of diseases which are of considerable health import. The U. S. Public Health work on autolyzed yeast to which we gave space several years ago laid the foundation for the product. Let us hope it may prove effective.—ED.]

A Method of Testing Milk for Keeping Quality. Holding that the bacteriologic count gives no indication of the keeping qualities of market milk, L. H. Coolidge and R. W. Wyant[5] devised a simple method which they recommend as practical. Ordinary bouillon cube broth was prepared and the indicater Brom thymol blue was added. The broth was then adjusted to PQ 7, and 10 c.c. portions were placed in large test tubes and sterilized. One-tenth cubic centimeter of the milk was added to the test tube of bouillon and incubated at 37° C. The specimens are examined at intervals of one hour. A comparator designed in their laboratory facilitated comparison with standard specimens.

A system of scoring was devised. A specimen scoring 75 or over would be sweet at the end of twenty-four hours, while specimens scoring less than that would be found sour in twenty-four hours. Samples scoring fifty-five would be on the verge of souring in twenty hours at room temperature. Those scoring over 60 would be sweet at the end of twenty hours and those scoring under 55 would be sour—room temperature. The method is simple, easy to operate and requires no apparatus.

Classification of Milk. C. E. Marshall[6] has found very considerable advantage accruing from the clarification of milk. His conclusions are:

The clarifier strains out the insoluble dirt much more effectively than does any strainer now employed. Since the stable dirt is from 10 to 30 per cent. soluble, clarification removes from 70 to 90 per cent. of the dirt. It removes cellular elements in a large degree. It removes microörganisms in varying amounts. The larger organisms are more effectively removed than the

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(5) Amer. Jour. Pub. Health, December, 1920.
(6) Ibid., February, 1920.

smaller ones. It removed over 99 per cent. of *Vidium lactis,* over 99 per cent. of sacch. cerevisiae, 24 per cent. *Streptococcus lacticus* and 23 per cent. *B. prodigiosus.*

This quality of removal of larger quantities of the larger organisms and leaving behind more of the smaller ones causes the milk when kept to sour well and is slow to putrefy. The flavor of the milk is improved by clarifying.

Electrical Sterilization of Milk. Beattie and Lewis[7] continue their investigations on the sterilization of milk by the use of electricity. Sir Oliver Lodge and Professor Leith having been employed by the Research Committee reported that the method was effective in killing tubercle bacilli and other organisms and in sterilizing milk. They commended the method as quick and effective but pronounced pasteurization to be effective and cheap. They said the effect was due to heat. While the temperature of the milk as a whole is not raised high, the effect is due to a higher temperature produced almost instantly and maintained momentarily. The taste is not altered and 99.93 per cent. of the bacteria of all kinds are killed.

Beattie and Lewis found that the temperature never went over 63° or 64°C. and the effect was not due to heat nor was it due to copper ionization. They suggest that it may be due to nascent peroxide, a type of Buddeising.

Cheese. Schroeder and Britt[8] make the following statements relative to the danger from eating cheese:

Cream cheese is often strongly contaminated with tubercle bacilli of the bovine type and for this reason it should be made with pasteurized milk and cream, or with milk or cream from tuberculin-tested cows.

Those cheeses which must be aged before being marketable rarely contain living pathogenic bacteria.

Neufchatel cheese made with skim milk is less frequently infected with tubercle bacilli but we are not justified in making Neufchatel from unpasteurized milk.

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(7) Med. Research Com., Brit. Health Insurance, Spe. Rep., Series No. 49, 1920.

(8) Ann. l'hyg. pub. et. de. méd. legale.

Efficacy of Preservatives. K. G. Bitting[9] investigated the efficacy of a considerable group of preservatives in preventing the growth of moulds. The moulds used for the experiments were *Penicillium expansum, Alternaria solarii* and *Oidium lactis.* The preservatives were those in long time domestic use but generally not regarded as disinfectants, antiseptics or preservatives in a scientific sense.

His first group investigated consisted of sugar, salt and saltpetre. In a 15 per cent. solution of salt, oidium did not grow and the other two grew very slowly and poorly. Restraint of growth with 10 per cent. strengths was less effective.

Sugar was used in 25 to 66.66 per cent. strengths. There was some growth in even these strengths but with 50 and 66.66 strengths it was very poor.

Saltpetre restrained growth but very little even in 25 to 30 per cent. solutions. It has been suggested that in pickling meats saltpetre acts by being converted to nitrites and nitric oxide. The moulds are not killed by either of these agents but by plasmolysis are made relatively incapable of development.

The next group was composed of allspice, cinnamon, cloves and mustard and other aromatics of that group.

Celery, curry, ginger, garlic, mace, paprika, pepper, red and black, and sage were found to be without any practical preservative properties. Allspice, cinnamon, cloves and mustard each contains aromatic oils which are antiseptic and preservative when used in proper strengths. They disorganize the cell wall of moulds and prevent them from growing; but in practice they have no antiseptic action. Used in strengths sufficient to be preservative they impart flavors too strong to be commercially feasible. This is true of ketchups as well as other prepared foods. The proportion of preservative oils in the condiment is not large and cooking extracted only 33.33 per cent. of that present in allspice, 27.8 per cent. of that present in cassia and 11.5 per cent. of that in cloves. Mustard produced some effects when the proportions used were quite small.

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(9) Brochure. November, 1920.

The third group embraced the organic acids ordinarily found in fruits and vegetables. Citric, lactic and malic acids were without effect practically even when strengths as high as 6 per cent. were used. Tartaric acid in 4 per cent. solution caused some dwarfing of moulds. Stronger solutions were more effective. Acetic, benzoic, boric, butyric and salicylic acids and their sodium salts were all effective preservative agents.

Bitting says that while manufacturers have been forbidden to use these preparations many of them are in general use among domestic and household canners, being sold under trade names which do not disclose the fact that the effective ingredients are substances against which there is popular prejudice.

The fifth group comprised the following mineral salts: Alum, sulphate of copper, sulphate of iron, acetate of lead, sulphate and sulphite of soda, tin, oxide, phosphate, protochloride and sulphate and zinc sulphate. These were all effective preservatives even in fairly small proportions except stannous oxide and stannous phosphate.

The sixth group was composed of the mineral acids and alkalies. The acids used were hydrochloric, nitric and sulphuric and the alkalies were caustic potash and caustic soda. Since all the members of this group are violently destructive to living organisms the only question was as to the effects of different strengths on growths of moulds. In some instances growth was not stopped by a 0.5 per cent. solution. Generally speaking it was greatly altered by a 0.2 per cent. solution.

The seventh group embraced salts of atropine, cocaine, morphine and strychnine, quinine and mercuric chloride, phenol and oxalic acid. With the exception of quinine, none of the alkaloids was inhibitive to any degree worth noting. There was only a slight retardation with quinine. Mercuric, chloride, phenol and oxalic acid were all effective.

As a rule mixtures of preservatives were not so effective as the same strength of a preservative used singly. There were two exceptions. When acetic acid and sodium benzoate were used together there was an increased effect. The same was true of salt and sodium benzoate.

Botulinus Poisoning. Paul F. Orr[1] has found that *B. botulinus* grows readily and produces very strong toxin in canned peas, corn, baked beans, string beans, carrots, hominy and asparagus besides the various meats. He doubts its ability to grow and produce toxin in fruits as canned, on account of the acidity. However, Dickson found that it would grow in acid fruits the acidity of which had been neutralized. The few outbreaks of poisoning in which fruits have been held to be the cause have not been well studied from the etiologic standpoint. Ripe olives as bottled are neutral in reaction. Green olives are too acid for the organisms to grow. One outbreak has been found to have been caused by home-made cottage cheese.

The toxin deteriorates very slowly when standing in the dark. Infected beans were still poisonous at the end of a year. A temperature of 80° C. for from 5 to 10 minutes destroys the toxin. Any food heated to the boiling point is safe, so far as this toxin is concerned. Food preserved in brine which is stronger than 8 per cent. with salt will not grow botulinus. Growth will not be inhibited in a sugar solution of less than 50 per cent. strength. The antitoxin must be given early to have any effect. *B. botulinus* growing in food produces gas, makes the food soft and mushy and brings a rancid or even putrefactive odor and a bad taste. All food with such qualities should be thoroughly cooked and then thrown in the garbage pail. A good many chickens and pigs have been killed by eating garbage containing botulinus toxin. Suspicious food should not be tasted. All foods to be preserved in cans or bottles without air should be heated to 120° C. or longer. Home canning does not use enough heat to sterilize against botulinus.

No one knows more than E. C. Dickson[2] of the poisoning, botulism, which caused so much alarm in the year 1920 in the United States. He tells us that there was so much botulism among the eaters of sausage between 1735 and 1802, especially in Wurtemburg that

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(1) Commonwealth, May-June, 1920.
(2) Amer. Jour. Pub. Health, November, 1920.

in 1820 a German law was passed making this condition reportable at the health department.

Dickson up to June 30 had records of fifty-four outbreaks in the United States all but three occurring in the last eleven years. All affected human beings to the number of 228. Of forty-five outbreaks in which the food responsible was determined, thirty-eight were due to preserved food, fruit and vegetables. In addition, there are reports of twenty-two other outbreaks affecting animals poisoned by eating food from the garbage can. Of the outbreaks in the United States, 80 per cent. were due to eating fruits and vegetables which is in marked contrast with European experiences.

The human mortality has been 67.98 per cent. indicating that only the severe cases have been reported.

There are two strains of the *Bacillus botulinus*—*A* and *B*. Each has its toxin. The type most prevalent in foods packed in the East has been *B*. That in foods packed in California has been *A*. The toxin for *A*. is not very effective in poisoning due to *B*. and *vice versa*. But the principal shortcoming in the use of antitoxin has been its tardy administration. The symptoms are slow in appearing. Diagnosis requires time and after the use of antitoxin has been decided on time is required to obtain and use it. Theoretically a polyvalent antitoxin should be a perfect curative agent. In practice it may become so.

Dickson says that *B. botulinus* is liable to develop in any food substance. Cleanliness is not a sufficient safeguard. Heat sterilization must be made use of. The temperature employed in home canning is not high enough, he says, to guarantee safety. The present rules of the State Board of Health of California as to ripe olives require 240° F. for 40 minutes and the use of brine strong enough to prevent fermentation. Taste, appearance and odor are not safe criteria for the presence or absence of botulinus toxin. All foods can be made safe by boiling just prior to use. Olives and all other canned foods can be boiled without changing the taste.

E. C. Dickson[3] bases some conclusions relative to

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(3) Calif. State Jour. Med., February, 1920.

botulinism on information gained from fifty-eight outbreaks, forty-five in human beings and thirteen in animals or fowls. Several of the outbreaks in animals were caused by throwing spoiled foods into the garbage can. Forty-nine of the outbreaks were traceable to foods packed on the Pacific Coast.

While food in which *Bacillus botulinus* has been active has a rancid taste and a cheese-like odor, Dickson finds on the one hand that some highly poisonous food has been very little off in flavor and on the other hand persons have been killed by merely tasting poisonous food. He warns against tasting food suspected of being spoiled and also against accepting taste and odor as a standard of freedom from botulinus toxin.

While the bacillus is only killed by a high degree of heat the toxin is readily destroyed by heating. All known outbreaks have been due to food tasted to determine if it was good or food served uncooked such as salads, string beans, asparagus, olives, apricots and pears. The only safe plan is to condemn food on suspicion rather than proof.

While most of the epidemics reported on by Dickson have been due to eating home canned foods, four were due to eating commercially prepared foods. In these the heating had not been to a temperature sufficiently high.

Bacillus botulinus seems to make a more virulent poison or to make more of it in this country than elsewhere. In 189 cases of botulinus poisoning reported in the United States 133 persons died.

The stomach should be washed out even though the poisoning occurred several days before. Antitoxin, preferably a polyvalent serum, should be used.

Meat Inspection. John Roberts[5] informs us that about one-third of the meat produced in the United States is federally inspected. Since all export meat is so inspected it follows that at least one-half of the meat consumed in the country is not inspected by the federal government. It is altogether probable that the majority of the sub-standard animals or animals known to be or suspected of being sick are marketed through the

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(5) Amer. Jour. Pub. Health, September, 1920.

slaughter houses which do not have government inspection.[6]

Municipal abattoirs are found in Bridgeport, Conn.; New Britain, Conn.; Albany, Ga.; Baton Rouge, La.; Raleigh, N. C.; Winston-Salem, N. C.; Devil's Lake, N. D.; Grand Forks, N. D.; Ogdensburg, N. Y.; Beaumont, Tex.; Paris, Tex.; Port Arthur, Tex.; Taylor, Tex., and Winchester, Va.

Central abattoirs are found in Anniston, Ala.; Hartford, Conn.; Atlanta, Ga.; Augusta, Ga.; Columbus, Ga.; La Grange, Ga.; Savanna, Ga.; Terre Haute, Ind.; New Orleans, La.; Pittsfield, Mass.; Detroit, Mich.; Moorhead, Minn.; St. Cloud, Minn.; St. Paul, Minn.; Meridian, Miss.; Lincoln, Neb.; Nashville, Tenn.; Norfolk, Va.; Roanoke, Va.; Yakima, Wash. However, in not even all these is there inspection which is up to standard.

Washing Dishes. R. S. Dearstyne[7] found that hand-washed coffee mugs, water glasses, spoons, knives and forks were far less clean as shown by laboratory tests than similar eating utensils washed by machinery. Dishwashing in most restaurants and other public eating houses is very poorly done.

HEREDITY

Inheritance of Certain Mental Qualities. The inheritance relations of certain constitutional mental disorders is discussed by C. B. Davenport.[8] Idiots are feebleminded with a mental age of less than two years. Idiocy is frequently the result of severe infection occurring before birth or in early infancy. It may result because of syphilitic infection or because one or both parents were saturated with alcohol or other drugs. However, the great mass of idiots arise from feebleminded parents.

In the case of morons and a large percentage of the imbeciles we find no evidence of infections or persons to account for the condition, but inheritance relations

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(6) The Country Slaughter House: How to Build It, by G. H. Parks, Amer. Jour. Pub. Health, September, 1920.

(7) Amer. Jour. Pub. Health, November, 1920.

(8) Psychol. Bull., September, 1920.

can be demonstrated. However, we must bear in mind that some of the supposed feebleminded are backward only and, given time, will reach the normal. Backwardness is in part the result of environment and in part the result of inheritance.

As to the inheritance of feeblemindedness this seems to be the law. When both parents are mentally defective all the children will be so also. If neither of the parents is defective but if they both have close relatives that are, about one-quarter of the offspring will show the defect. When one of the parents is defective and the other not but from a defective family then one-half of the offspring will be defective.

Davenport suggests that the feeblemindedness among Europeans and Americans may not be due to the inheritance of qualities acquired from trauma, illness or bad environment but may be due to persistence of the mental type of the men of the Stone Age. The blood stock of most of us contains some strains inherited from Stone Age ancestors. He quotes Herman as having argued that Mongolian imbecility is a recessive Mendelian trait. The parents of such children are not infrequently neurotic. A neurotic family idiocy has been shown by Brandeis to be a simple Mendelian recessive.

Fischbein is quoted as classifying the epilepsies into one hundred or more groups. Conditions which are widely different in their basic natures and causes are alike enough in symptoms to be grouped as epilepsy. Therefore, there is no inheritance law which applies to all. A law applicable to many is: When both parents have the epileptic tendency all the children will have it. If both parents, while showing no symptoms of epilepsy, carry the determiner for the defect in their germ cells one-quarter of the children will be epileptic. If one parent be epileptic and the other simplex for it half the children will be epileptic. But if one parent is entirely free though the other is epileptic there is little probability that epilepsy will appear in the children.

Among the rather definite types of epilepsy is the dementing form which usually shows itself about the onset of adolescence and which leads to the gradual loss of the mental powers. When persons of an epileptic taint are not epileptic they may have migraine or some alcoholic, hysterical or neurotic tendencies. Flood and Collins say that epilepsy, feeblemindedness, insanity, extreme nervousness, migraine, alcoholism, sexual immorality and lack of moral sense are all akin.

Davenport classes as related conditions a group of disorders having the same element of periodicity. Among these are dypsomania, migraine, certain forms of insanity, excessive irritability, temperamental explosions and inability to control the sex instinct. To this he adds the tendency to run away from home. This last he adds is a sex-linked trait inherited in the same fashion as hemophilia and color blindness. In other words, the man inherits it from his mother's side only, her brothers or father having shown the tendency though she herself was staid.

The element of periodicity in all the above mentioned disorders has a "clear inheritance basis." Myoclonic epilepsy is a simple recessive Mendelian trait. Dementia precox in which the dementing process develops gradually has a clear constitutional basis. It is inherited as a simple Mendelian recessive following the same laws as feeblemindedness and common epilepsy.

Temperament is, of course, a group term embracing many different conditions. Temperamental output depends largely upon the degree of functioning of the endocrine glands. A study of the inheritance of one kind of temperament, namely outbreaks of violent temper, shows it to be inherited as a Mendelian dominant. It does not skip generations. The inheritance laws of more complex temperaments are more complex and less well understood.

MILITARY HYGIENE

Modern Medicine[9] publishes the following table:

Final revised figures of American Army casualties in the war have been announced by the Adjutant General. They show that the total casualties were 302,612, with deaths numbering 77,118. Prior figures, based on weekly

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(9) March, 1920.

casualty summaries issued by the War Department, gave the total as 293,061, with 77,635 deaths.

The revised figures are as follows:

Killed in action	34,248
Died of wounds	13,700
Died of disease	23,430
Died of accident	2,019
Drowned	300
Suicide	272
Murder or homicide	154
Executed by sentence of general court martial	10
Other known causes	489
Causes undetermined	1,839
Presumed dead	650
Total dead	77,118
Prisoners unaccounted for	15
Prisoners died	147
Prisoners repatriated	4,270
Total prisoners	3,432
Wounded slightly	91,189
Wounded severely	83,390
Wounded, degree undetermined	46,480
Total wounded	221,050
Missing in action	3
Grand total	302,012

Army Hygiene. M. P. Ravenel[1] thinks we did very well in the Great War so far as disease prevention was concerned. But comparison of soldiers with civilians of the same age period is not altogether favorable to the former. There was less typhoid, diarrhea, dysentery, smallpox and malaria but on the other hand there were more measles, meningitis, pneumonia, scarlet fever and influenza. We were not able to control respiratory diseases in the army. The large-roomed barracks must go. Rooms must have more air space per occupant per room. Unnecessary shifting of troops must be limited.

Canadian Army Vital Statistics. J. W. S. McCollough[2] says that in the World War there were half a million Canadians enrolled. Of these 51,853 died of wounds and 2,815 from disease. The number of deaths

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(1) Jour. Mo. State Med. Ass'n., February, 1920.
(2) Canadian Med. Ass'n Jour., September, 1919.

from wounds was over eighteen times that from disease. He says:

"Smallpox, thanks to vaccination, was practically an unknown factor in the Canadian Army in Canada. I personally know of but a single case."

Health of British Troops in Macedonia. A report clearing up some disputed points is that of A. G. Phear[3] on the health conditions of British troops in Macedonia and the Caucasus.

In 1916-17-18 there were 161,560 admissions to hospital for malaria, a rate per 1,000 of 331 in 1916, 353 in 1917 and 369 in 1918 or a total of 1,053 per 1,000 for the three-year period. Figuring on this basis we estimate the total force as 153,374 men.

The best method to prevent relapses of malaria was to give 30 grains of quinine on each of two successive days in each week. This resulted in 78 per cent. of nonrelapsing cases.

[The Bass method apparently was not tried.—Ed.]

The results in the treatment of acute attacks by intramuscular injection were safe and efficient; they did not have the abscesses written of by L. S. Dudgeon in October, 1919, in the *Journal of Hygiene.* Amblyopia after treatment was frequent. In only a few cases was there permanent and complete blindness.

Phear confirms the observation so frequently made in this country that the type of malaria changed as the season progressed.

British surgeons had a good opportunity to study blackwater fever or hematuria. In many cases there was a definite history of malaria. No support was found for the theory that hematuria is due to quinine. The treatment of hematuria consisted of applying heat and of giving the patient large quantities of fluid by subcutaneous injection, intravenous injection, and by mouth and rectum. Quinine helped patients in whom the spleen was enlarged or in whom parasites in abundance were found.

Second in importance was dysentery. The total number of admissions during the three years was 21,147. The rates *per annum* were: 1916, 64; 1917, 29; 1918, 58.

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(3) Lancet, July 10, 1920.

The number of deaths in three years was 414. The most important cause of dysentery was human carriers. Curves showed an accurate parallel between dysentery prevalence and fly prevalence.

The reports of the great prevalence of typhoid and paratyphoid fever among the troops in this expedition having been circulated the statements of Phear on this point are of especial interest:

"Of the enteric group I have little to say. The troops were well protected and the incidence was small. The admission rate was 11.77 in 1916, 2.5 in 1917 and 0.84 in 1918."

The distribution of the cases was: 1916, typhoid 1 per 1,000; paratyphoid *A.*, 2.3; paratyphoid *B.*, 2.1 and clinical continued 6.2; 1917, typhoid, 0.3; paratyphoid *A.*, 6; paratyphoid *B.*, 4; clinical continued, 1.1; in 1918 typhoid, 0.1; paratyphoid *A.*, 3; paratyphoid *B.*, 0.1; clinical, 0.3. Only sixty-five deaths from all three forms occurred in the three years. The majority of severe cases were due to *Bacillus typhosus* and were admitted to hospitals from ships arriving at the port.

Influenza first made its appearance among prisoners of war in June. The disease was uncontrollable. The total number of admissions was 17,813 or at a rate of 111.33 per 1,000 troops and the total number of deaths was 1,387 or 8.67 per 1,000; or almost one man in each 100 died of influenza. The disease started as a tracheitis and speedily became a capillary bronchitis. The patients fought for breath.

There were some cases of sandfly fever.

There were a few cases of typhus and also a few of relapsing fever, especially after the troops were sent to the Caucasus.

Military Training. Surgeon-General Ireland[4] argues strongly for six months military training of all boys 19 years of age. There were benefits to the health of the nation in his opinion and these may in time offset what it cost us.

About 5 per cent. of the population was called to the colors. Among the benefits were improvement in physical development of this large group as a result of outdoor

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(4) Jour. Amer. Med. Ass'n., Feb. 21, 1920.

life, good food, regular exercise and strenuous physical training. There was an average gain in weight of several pounds per man, and this gain was almost entirely in muscle tissue.

A six months training of all men 19 years of age would produce similar good effects. There would be gain from a physical examination of each boy of 19. Of the men examined for the draft, 29 per cent. had physical disabilities which disqualified them. The more important of these were distributed as follows:

SOME IMPORTANT DEFECTS REVEALED BY THE DRAFT.

		Per Cent.
1. Defects of feet (flatfoot, 11 per cent.)		13
2. Venereal diseases:		
During first period of draft	2.9	
In later period of the draft	5.7	8.6
(Increase due to improvement in method of examination and tabulation, and also to the larger percentage of negroes inducted during the later period.)		
3. Hernia and enlarged inguinal rings		4
4. Defective vision (largely refractive errors)		3.33
5. Defective physical development (including underweight and underheight)		3.33
6. Organic diseases of the heart		3
7. Deformities or loss of extremities		3
8. Tuberculosis		2.50
9. Hypertrophy of tonsils		2.33
10. Defective and deficient teeth		1.33
11. Mental deficiency		1.25
12. Otitis media (purulent)		1
13. Hemorrhoids, varicose veins (combined)		1
14. Goiter (simple and exophthalmic)		0.75
15. Deformities of hand		0.75
16. Cardiac arrhythmias and tachycardia		0.50
17. Asthma		0.25

Only 53 per cent. of all the men examined were accepted as fully meeting the standards with no defects recorded.

Among other benefits from military training are instruction in sanitation and personal hygiene and education in sex hygiene. The experience of the war demonstrated the wide prevalence of venereal disease among the civilian population and the low venereal disease rate among our soldiers after they had been in the army several months.

Training in discipline and development of respect for authority, the compulsory vaccination against typhoid fever and smallpox of all young men will be very helpful to the country.

Physical Education of Sailors. K. D. Bell[5] says that it was easy in the British Grand Fleet to keep the 10 per cent. of the personnel who excelled at games fit, amused and energetic. The trouble lies with the 90 per cent. who are inferior in physical strength, nerve and muscle coördination, dexterity and skill and who can not successfully contend in competitive games.

In the four long years of waiting with the Grand Fleet the men making up this 90 per cent. were a difficult problem. A scheme of competitions in which the entire corps competed was devised. For instance, in the 100 yard run each person ran and his time for the distance was recorded on a score card on which a percentage value for each rate of speed was used. The records were kept on these score cards. In a company competition each man did each of the required stunts and was scored on a percentage basis on each stunt. The aggregate of all the scores was the score for the company.

The plan was devised especially to bring out the capacities and to stir the interest of the 90 per cent. in athletic, recreational and play competitions. Massed singing and dancing were also employed.

Bell says that in the critical days of the last year or two of the war only 36 per cent. of the men in the Grand Fleet were fit to fight. General Sir. H. S. Horne said: "It was utterly scandalous that the British should have ranked at the bottom of the list as regards physical fitness of the nations from whom they were able to obtain statistics during the war." This was because Great Britain, while it had developed the 10 per cent. had no system of physical education for the development of the 90 per cent.

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(5) Lancet, Jan. 31, 1920.

PERSONAL HYGIENE

Physical Development. James Galloway[6] advocates bringing together somewhere the records of physical examinations. This record should begin with the record of the physical examination of the school child. Many colleges and universities require periodical physical examinations. Many employers require some sort of a physical examination of all applicants for work. A fair proportion of men not otherwise covered voluntarily submit to periodical physical examinations. Finally, there are records of millions of examinations. If all data could be assembled and tabulated many valuable lessons could be drawn.

If a man's physical examination record starting with his school record could stay together and be accessible for the man great good would come of it. In the last twelve months before the armistice the British examining surgeons classified those examined as follows:

Grade 1	871,769	(26%)
Grade 2	546,276	(22%)
Grade 3	756,859	(31%)
Grade 4	250,280	(10%)

Arthur Keith by examining 1,000 young men of average health and strength thus established a proportional standard. By applying this standard we get what would have been the proper distribution of this mass of drafted men:

Grade 1	1,697,595	(70%)
Grade 2	485,040	(20%)
Grade 3	181,902	(7.5%)
Grade 4	60,647	(2.5%)

On Keith's scale his 1,000 men graded 89.3 per cent. On the same scale the drafted men examined graded 70.9 per cent.

Among the large factors responsible for the poor showing were: (1) poor physique and the presence of physical defects; (2) tuberculosis; (3) diseases and degenerations of the heart and blood-vessels.

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(6) Brit. Med. Jour., Sept. 11, 1920.

The men from the eastern part of England scored only 68.9 per cent on the Keith scale. Of 3,689 rejected in Eastern England 422 had poor physiques or physical defects, 300 had disease of the heart and vascular apparatus.

An analysis of the cause of rejection of farmer recruits was interesting. Ordinary farmers furnished a good many rejects largely because of bad feet and rheumatism. Shepherds and men who cared for stock, particularly in the mountains, were usually sound.

Muscle Strength and Fatigue. E. G. Martin[7] listed the muscle strength of a large number of workers, men and women, making use of the standard short test of Martin and Rich.

Among his conclusions are the following:

Physical condition as shown by strength tests bears a definite relationship to industrial efficiency as expressed in output. Strong workers show less fatigue than do weaker workers. The effects of fatigue are persistent in that they tend to appear on the day following a day of fatigue.

There is no evidence that the strain of night work in an eight-hour shift changing every two weeks impairs physique. Persistent exposure to temperatures above 86° F. is unfavorable to strength. Relative humidities between 70 and 80 per cent. appear to favor high strength showing.

"Hardening." S. B. Grant, S. Mudd and A. Goldman[8] making use of an apparatus used in previous experiments demonstrate that chilling of the body surface causes ischemia of the mucous membrane of the palate, pharynx and palatine tonsils. Upon warming the body this ischemia was replaced by congestion of the tonsils and in lesser measure by the surrounding mucous membrane. There seemed to be an increase in the number of bacteria on the tonsils and pharyngeal mucous membrane though the authors warn against accepting this conclusion as final.

The hypothesis is advanced that one factor in the beneficial hardening effect of cold bathing and outdoor living

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(7) Public Health Rep., Aug. 13, 1920.
(8) Jour. Exper. Med., July, 1920.

with its incident heightened immunity to respiratory infection may be the training of the vasomotor system in the direction of development in the pharynx of a reaction of hyperemia following chilling, similar to that observed in the tonsils of these subjects. In some of those experiments the subjects developed sore throat.

SCHOOL INSPECTION

School Inspection. After discussing the shortcomings of statistics of medical inspection of school children, John Priestly[9] announces the following conclusions drawn from statistical studies of many thousand examinations extending over several years:

Girls have from four to five times as much pediculosis as boys.

Among children of from 5 to 15 years girls have 50 per cent. more pulmonary tuberculosis than boys.

Rheumatism is more prevalent among girls.

Hernia is more prevalent among boys.

Mouth breathing is markedly more prevalent among boys. This is true at ages 5 to 6, 8 to 9 and 12 to 13.

Rickets which occurs in from 1 to 2 per cent. of children in marked degree in Staffordshire and in minor degree in from 20 to 30 per cent. is more prevalent in boys.

All the more serious nervous disorders, congenital or acquired, mental deficiency, mental backwardness, paralysis, spasmodic affections (except chorea), stammering, lisping and iodioglossia are constantly more prevalent among boys. The girl's nervous system seems the more stable.

Ringworm and impetigo affect especially children of from 5 to 9 years.

Rickets and mouth breathing are more in evidence in young children.

The percentage of deaf children was about 5. From 25 to 30 per cent. of the mouth breathers were deaf; from five to six times the proportion found in all children.

There was no evidence of any marked relationship be-

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(9) Med. Officer, Sept. 19, 1920.

tween caries and the use or neglect of the tooth brush, nor between mouth breathing and caries. Poor children did not have sounder teeth than the better-to-do.

The study taught the comparative innocuousness of the majority of cases of genuine heart disease and the unexpectedly wide prevalence of functional disturbances of the heart, bruits, dilatations and disturbed rhythms.

There were a great number of cases of slight thyroid enlargement which had nothing to do with genuine goiter.

Lice in School Children. R. H. Vercoe[1] made use of his connection with the Colchester (Eng.) schools to valuate parental negligence and school control in the spread of head lice among school children. Negligence of parents was found to be very much the larger factor. Any parent can keep a child's head free from lice and most of them do. The exceptions are the ignorant and indifferent. The history of the children in the Colchester schools shows that year after year the children from certain families are clean and those from other families are lousy. The percentage of infested heads was highest on the first day of school. It was estimated that 35 per cent. of infestation took place in schools.

Head lice do not readily quit the hair. Hats and cloakrooms were not factors of importance in spreading head lice. Valuating the different methods of clearing the head of lice Vercoe says that an intelligent person can get rid of all lice and nits in three hours. Ordinary parents required about fifty hours to get rid of all lice and nits.

In the case of one school, 100 per cent. results were obtained by excluding all lousy children from school and having the nurse follow up with home visits and treatment. In another school where the lousy children were not excluded but a nurse went to the homes and gave instruction and treatment only 14 per cent. of the infested heads had been cleaned at the end of three weeks.

Lice can be easily killed by applying white precipitate ointment, sassafras oil, paraffin or lysol.

The problem of nits is a far more difficult one. The difficulty is to separate the nits from the hair. For this

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(1) Med. Officer, July 24, 1920.

purpose very much the best application is hot vinegar (140°F). Heat is more of a factor than the vinegar. Therefore, the directions now read hot vinegar. One and one-half hours suffices to loosen all the nits.

Bacot and Lloyd[2] advise 2 per cent. lysol at 37°C. for thirty minutes, or kerosene at 20°C for five minutes to kill nits and lice.

A school health officer writing in *The Medical Officer*[3] says that when any strong smelling stuff such as kerosene is applied to the head about half the lice drop off quickly to avoid being killed. These are liable to get on the heads of other members of the family. Therefore, he advocates treating the entire family.

Undernourished School Children. K. B. Rich[4] conducted a considerable piece of work in the public schools of Chicago which indicates that undernourished school children get on just about as well without open air schoolrooms, rest periods and milk as they do when they get those advantages. In fact in the open air school where rest periods, milk and a noon dinner were provided the pupils did not gain as much as they did in another school.

Undernourished school children 13 years and older seemed to require no help except to be told what their trouble was and how to remedy it. They could be depended on to take it up with their parents and to remedy conditions at home. However, each child must be personally talked to, convinced and shown. In accomplishing the same results with children of from 2 to 6 years and also those from 6 to 13 years, there must be home visiting and the coöperation of the parents with the school.

Rural School Children in Wisconsin. C. A. Harper[5] gives the following information as to contagion history of the children in the rural schools of one Wisconsin county. The report does not state how many of these attacks antedated school age and how many occurred among children in attendance at school:

Out of a total of 2,452 rural school children in La-

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(2) Brit. Med. Jour., Oct. 29, 1919.
(3) Aug. 7, 1920.
(4) Jour. Amer. Med. Ass'n., Nov. 27, 1920.
(5) Wisc. State Board of Health Bull., April-June, 1920.

Crosse County who were examined and questioned by the teachers, the following facts are presented:

Fifty-five reported that they had had diphtheria; twenty-three reported having had infantile paralysis; 124 had had scarlet fever; twenty-four typhoid fever; eleven tuberculosis; 937 had had chickenpox; 766 had had mumps; 1,520, or 62 per cent. had had measles; 136 reported having had smallpox; only 295 had been vaccinated for smallpox. In 1,284 cases the children reported that they had never been vaccinated for smallpox. One thousand, or 40 per cent., had had whooping cough; five had had acute cerebrospinal meningitis and 1,160, or 48 per cent., had had influenza.

CONTROL OF CONTAGION

Prevalence of Contagion. A valuable study of the age distribution of certain forms of contagion based on reports made the Detroit Health Department is presented by G. T. Palmer.[6]

PERCENTAGE OF DISEASE

	Below 2 years of age	Below 5 years of age	Below 10 years of age
Whooping cough	20.9	61.4	96.
Measles	14.5	51.6	89.
Chickenpox	8.	28.9	83.
Scarlet fever	3.	26.2	70.
Diphtheria	4.2	26.8	68.
Smallpox	2.9	10.2	18.5
Tuberculosis	.4	2.3	9.2

The table shows that a very large proportion of whooping cough and measles and a fair proportion of the chickenpox, scarlet fever and diphtheria occurs in children of less than school age.

The following table shows the percentage of disease found in five years of school life in which practically all children are in school (5 to 10):

Whooping cough	34.6
Measles	37.4
Chickenpox	54.1
Scarlet fever	44.8
Diphtheria	35.2
Smallpox	8.3
Tuberculosis	6.9

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(6) Detroit Monthly Bull., June 20, 1920.

Another study showed the case fatality of different diseases at different ages in percentages:

	Under One	One	Two	Three	Four	Five to Nine
Whooping cough	21	18	6	1.7	8	0.3
Measles	27	15	4	3	1	0.0
Chickenpox	70	0	0	0	0	0.2
Scarlet fever	29	6	8	6	2	1.5
Diphtheria	32	47	19	15	11	7.
Smallpox						1.1
Tuberculosis						1.4

Of the entire group the only disease retaining its mortality well into the school age was diphtheria. This table teaches that children under one year old should be sedulously guarded against contagion and the older they are when they develop contagion the better chance for recovery they will have. The second table indicates that a very large percentage of the chickenpox and scarlet fever occurs in five school years (5 to 10) and a considerable proportion of the whooping cough, measles and diphtheria.

Measles. John Brownlee[6] investigated the age distribution of cases of and deaths from measles in Aberdeen and in the hospitals of Glasgow over a long period of years. This study convinced him that measles was a widespread and highly fatal disease among young children but it was of much less importance among older children. While children under 6 months of age are almost immune to it babies between 6 and 12 months of age not only are quite subject to it but have a high death rate from it.

Most of the contagion among younger children is brought to them from the schools, although most children over the age of 6 have had measles. Not many children in the higher grades have measles but those who do have it carry it home with them in many instances. He suggests that as a measure of administrative control school teachers have records of all the younger children in the families from which their charges are drawn. If a case of measles develops in a school all the record cards of children who have not had measles and who have younger brothers and sisters are assembled. This group

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(6) Brit. Med. Jour., April 17, 1920.

of children are especially protected against exposure. If they are exposed they are left at home during the first seven days, but from the seventh to the fourteenth day they are removed from contact with their younger brothers and sisters and kept at the homes of grandparents or other relatives who have no young children or else placed temporarily in institutions.

For the early diagnosis of measles Brownlee advises close observation of the temperature and eyes. If the child be put to bed two days before the outbreak of measles and the temperature taken several times a day it will be found that there is a fever lasting a few hours which comes about a day before the regular measles fever. He thinks children with oncoming measles should be kept warm in bed. The redness and swelling of the eyes begins on the lids and not on the eyeball.

Prevalence of measles in Aberdeen 1883 to 1902 and in hospitals in Glasgow is shown in the accompanying table:

	Aberdeen				Glasgow		
Age	Ratio attacks per 1,000 per annum	Cases	Deaths	Case Mortality per 100	Cases	Deaths	Case Mortality per 100
Months							
0 to 3	13.4	244	19	7.9	20	2	10
3 to 6	38.6	665	64	9.6	97	9	9.3
6 to 9	76	1,263	186	14.7	366	78	21.3
9 to 12	53.2	862	157	18.2	387	79	20.4
Years							
1 to 2	85.6	5,222	526	10	1,227	321	26.5
2 to 3	85.6	5,195	178	3.4	1,545	240	15.5
3 to 4	79.3	5,065	82	1.6	1,718	179	10.4
4 to 5	75.4	4,836	43	.9	1,600	80	5
5 to 6	86.3	5,352	35	.7	1,503	65	4.3
6 to 7	75.2	4,628	21	.5	1,235	33	2.7
7 to 8	47.3	2,818	14	.5	796	11	1.4
8 to 9	21	1,258	5	.4	398	6	1.5
9 to 10	11.3	672	4	.6	214	1	.4
10 to 11	6.7	406	1	.2	110	4	3.6
11 to 12	4.5	259	–	–	60	3	5.
12 to 13	4.1	241	–	–	47	–	–
13 to 14	2.9	169	2	–	28	–	–
14 to 15	2.6	150	–	–	23	2	8.7

Controlling Diphtheria. When in October, 1919, fourteen cases of diphtheria occurred in one school district in Kansas City, Kansas, at a time when there were no other cases in the city L. B. Gloyne[7] made cultures of the throats of the 367 school children in the district, finding thirty-four carriers. They seemed to have been infected by a child who had had diphtheria one month before and who had returned to school after being cured by antitoxin. All the carriers cleared up promptly when segregated. No treatment except gargles was given them.

Cross Infection in Diphtheria. G. H. Weaver and J. T. Murchie[8] examined the hands and finger nails of nurses, internes and other attendants in a diphtheria ward to determine the possibility of cross infection being due to these agents. Examination was made for diphtheria bacilli and hemolytic streptococci. Davis has shown that hemolytic streptococci do not occur on normal clean skin. The conclusion arrived at is that the hands of attendants are generally not free from the organisms sought for. Greater care in washing is required. Ordinary washing with soap and water is not enough. When making autopsies or doing other work requiring gross pollution rubber gloves should be worn. Doors should open without knobs.

T.-A. as a Preventive of Diphtheria. Victor C. Vaughan[9] warns against the indiscriminate use of T.-A. (toxin-antitoxin) as a preventive of diphtheria. In the first place he says the durability of the immunity produced has not been established. In the second if there is too much toxin in the mixture the result will be unfortunate. He advocates instead the temporary immunization of all contacts with antitoxin. The death rates of cases of diphtheria treated with antitoxin are as follows:

First day	No deaths
Second day	7.6 deaths
Third day	17.1 deaths
Fourth day	23.8 deaths
Fifth day	33.9 deaths
Sixth day	34.1 deaths
After the sixth day	38.2 deaths

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(7) Jour. Amer. Med. Ass'n., Jan. 10, 1920.
(8) Ibid., Dec. 27, 1919.
(9) Jour. Lab. and Clin. Med., February, 1920.

Prior to the application of antitoxin to the cure of diphtheria announced by Roux at Buda Pest in 1894 the death rate was sometimes as high as 70.

To this position against T.-A. as a preventive W. H. Park[1] replied. He says that he has proof that the immunity conferred by T.-A. lasts four years in some cases at least. He does not think it unsafe. He has given it in 40,000 cases without a single accident. If the dose of toxin is properly adjusted in the first place the mixture never becomes poisonous. The toxin loses its virulence as it ages.

Diphtheria in France. Diphtheria has been very satisfactorily controlled in Paris, thanks to the use of antitoxin as Louis Martin[2] demonstrates. The highest mortality from the disease in Paris was 100 per 100,000 in 1882. In 1883, Berlin had a rate of 200. Since the general use of antitoxin the highest mortality observed was during the epidemic of 1901-2 when 27.7 was reached. The lowest point reached in Paris was 6.4 in 1906. Havre had a rate of 3 in 1908 and Utrecht 2.6 in 1908. Since the use of antitoxin, the rate has always been under 20 and often under 10 in France. The lowest rates have obtained in villages with the best health departments and where antitoxin was best used. In 1890 to 1893, there were 3,911 children sick of diphtheria in the children's hospital, of whom 2,029 died—a case mortality rate of 51.75 per cent. The death rate among the cases in the same hospital treated with antitoxin since 1894 is 24.5 per cent. The best rate was that of 1904, 7.6 per cent. Including all diphtheritic anginas, the case death rate before antitoxin was 34 per cent.; since then it has been about 10. In the Pasteur Hospital under antitoxin the rate has been 8.18. In all hospitals it has been between 10 and 15. In the French Army 1888 to 1894 the number of cases of diphtheria was 3,551 with a case fatality rate of 11.07. From 1897 to 1914 it has been 3.3. During the five years of the war the hospitals behind the lines treated 15,371 cases of diphtheria with a case death rate of 2.4 per cent. In the front hospitals there were 11,433 cases of diph-

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(1) Jour. Lab. and Clin. Med., April, 1920.
(2) Presse méd., April 22, 1920.

theria with a mortality of 2 per cent. In the city of Paris the number of cases of diphtheria in a single year has been as high as 5,663. It has fallen year by year until 1,450 was reached in 1918. The number of deaths was 724 at a maximum. In 1918 it was 131. Under the use of antitoxin, diphtheria has decreased nine-tenths in Paris.

Martin predicts that when injection intravenously of antitoxin in very toxic cases comes into more general use there will be another drop in the rates. Injection of very large doses of antitoxin can be done with safety provided the antitoxin is diluted with nine times its volume of physiologic salt solution and the injections are given slowly.

Septic Sore Throat. Bit by bit there come additions to the study of the origin of septic sore throat. J. H. Brown and M. L. Orcutt[3] investigated an epidemic occurring in Boston. The epidemic was located as coming from one dairyman. The causative organism was found to be *Streptococcus epidemicus.* The source of infection was traced to a single quarter of one cow in a dairy of 112 cows. In this dairy there were many cows with garget and other forms of mastitis but the organisms present were not responsible for this epidemic. This cow had three normal quarters producing normal milk. The milk from the infected quarter was thick and yellow and contained *Streptococcus epidemicus* in pure culture, though the gland seemed normal. The other quarters were normal and the milk from them was practically sterile. Two weeks later, this quarter was shrunken and the milk from it was small in quantity and thick and yellow.

At the date of this second examination, the other quarter on the same side was normal in appearance but the milk gave 30,000 colonies *Streptococcus epidemicus* to the cubic centimeter. One week later, a third examination was made. In the meanwhile the teat from this quarter had been cut. The milk was thick, yellow, curdled and tinged with blood. There were 872,000 streptococci to each cubic centimeter in pure cultures. The other quarters did not become infected.

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(3) Jour. Exper. Med., January, 1920.

A number of milkers on the farm were found to harbor *Streptococcus epidemicus* in their throats.

Properly to safeguard the milk for use as raw milk, it is necessary as a minimum requirement there should be a regular examination of throat swabs from the milkers. The confining of a certain milker to a certain group of cows is highly desirable. In making cultures of milk, blood agar should be used. The use of this medium permits a differentiation of epidemics from other streptococci. The bacterial flora from the teats of cows with ordinary garget and mastitis was quite different from *Streptococcus epidemicus* and appeared incapable of producing septic sore throat. The flora of each cow of that group was fairly peculiar to that cow. The authors were not able to say whether the cow infected the milkers or the milkers the cow; or, if the milkers infected the cow, which milker was responsible.

Infantile Paralysis in Boston. The Weekly Bulletin of the Department of Health of New York City, Nov. 20, 1920, records an epidemic of infantile paralysis in Boston. It began the week of July 24 with one case and one death. The greatest number of cases in one week developed in the week of September 25—twenty cases. The greatest number of deaths occurred in the week of September 4—nine deaths. The total number of cases was 212; the total number of deaths, 40. This is about one-half the proportions of the epidemic of 1916.

Since practically all the cases occurred in children of pre-school age the schools were not closed. No special effort at hospitalization was made. Rarely did two cases develop in the same family. Many cases were abortive in type. Some of these had a transitory paralysis lasting a few hours only. The moderate measures for control seemed to succeed quite as well as did the severe restrictive measures employed in 1916. No serum was used to any considerable extent in this epidemic.

Influenza. As the reports of the 1918 epidemic of influenza continue to come in we find no more uniformity of opinion than prevailed among the earlier reports. C. E. A. Winslow and J. F. Rogers[4] reporting on the

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(4) Jour. Infect. Dis., March, 1920.

epidemic in Connecticut disagree with Raymond Pearl that there is no correlation between the explosiveness of the outbreak and the density of population.

In Connecticut, the sparsely settled rural communities were slowly infected, in fact, they escaped until measures of isolation broke down. However, Winslow and Rogers assert none of the orthodox methods of combatting epidemics applied in Connecticut exerted any appreciable influence on the spread of influenza. The case rate was from 200 to 400 per 1,000 population; the fatality rate 2 to 4 per 100 cases; the excess mortality rate was 5.5 per 1,000.

The high death rates were at ages under 5 and from 20 to 40. The authors do not think the low mortality of the older age periods was due to immunity from the epidemic of 1890. The mortality was low among the Irish, English and Germans. It was high among Canadians, Russians, Austrians and Poles. It was very high among Italians both in this country and in Europe.

The mortality was lowest in rural communities. Generally speaking it was lowest in those cities which were attacked last. Economic conditions and isolation seemed determining factors but there were cases in violation of both of these rules; in fact there were cases which seemed to contradict all rules.

An Influenza Cycle. C. O. Stallybrass[5] stimulated by the prophetic paper of Brownlee thinks that there is a minor cycle for influenza of thirty-three weeks or some multiple thereof, and a major cycle of ten years about. The bad influenza years in Great Britain have been 1789-90; 1802-03; 1830-32; 1840-41; 1848-49; 1851-54; 1869-70; 1879; 1890-91; 1898; 1918-19.

A study of the epidemic of 1918 indicated that there were three strains each with a periodicity of thirty-three weeks.

Influenza Mortality. A. J. McLaughlin[7] announced the following conclusions in the Shattuck lecture:

We have influenza with us every year—and in retrospect we can detect in the mortality statistics outbreaks reaching epidemic proportions in twenty-two out of the

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(5) Lancet, Feb. 14, 1920.
(7) Boston Med. and Surg. Jour., July 1, 1920.

thirty years since 1889. In 1918-19 the attack rate varied from 15 to 40 per cent. and seemed to be the highest in the age group 5 to 9., declining in each successive age group except 25 to 34, which exceeded the rate for the group 15 to 24.

Case fatality was about 2 per cent. The greatest mortality was usually but not always in the cities with a high explosive index. Some of the cities having a high explosive index in 1918 had a low index in 1920. There was some correlation between explosiveness, total excess death rate and the death rates from pneumonia, tuberculosis, heart disease and nephritis. All the evidence points to an immunity of relatively short duration, probably of months rather than of years. The cause is unknown. Laboratory work rather than epidemiologic studies offers a solution of the problems of influenza.

Influenza Vaccine. W. B. Leishman[8] gives certain experiences with an influenza vaccine prepared at the Royal Army Medical College as the result of a conference held in October, 1918, in the office of the Director-General of the Army Medical Service.

The original formula was influenza bacilli 60 millions, streptococci, 80 millions, pneumococci, 200 millions. Several strains of each organism freshly isolated were employed. Two doses at ten-day intervals were given. The first dose was one-half the quantities designated above, the second being the full doses. Later, the formula was changed to influenza bacilli 400 millions, streptococci 80 millions, pneumococci 200 millions. This vaccine was used in commands totalling 59,144 soldiers. Of those, 7,010 received one injection and 8,614 received two injections or a total of 15,624. In twenty-one of the twenty-four commands the incidence was far higher among the non-vaccinated, in two it was practically the same and in one the rate was higher among the vaccinated. The non-inoculated likewise had the higher death rate and the higher complication rate.

The conclusion is that in general the results are encouraging and they tend to confirm and even strengthen our original anticipations that a moderate degree of

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(8) Lancet, Feb. 14, 1920.

protection against infection might be expected while more decidedly beneficial effects might be hoped for in a diminution of both the frequency and the gravity of the pulmonary complications.

Sterilization of Dishes and Spread of Influenza. T. W. Jackson[9] is not in accord with the opinion of Lynch and Cummings[1] that unsterilized knives, forks and plates are in great measure responsible for the spread of influenza. He objects to the position to this effect taken by the U. S. Public Health Service in the bulletins, and says that luridly illustrated articles in Sunday newspapers advocating this view claim to have governmental sanction. In his opinion the low influenza rate at Newport News reported by Lynch and Cummings was due to the large number of negroes in that camp and not to the sterilizing of dishes. Negroes enjoy a considerable immunity to the disease. Jackson's experience with over 100,000 troops at Camps Meade, Custer and Bowie gives him a profound conviction that contaminated dishes, eating utensils and bad dishwashing arrangement had little to do with the spread of influenza or other respiratory diseases. "At Camp Meade I carefully analyzed the influenza statistics of 42,000 soldiers and found that dish-washing methods had no effect whatever in influencing the number of cases in that camp."

Sterilization of Cooking Utensils in Relation to Influenza. M. W. Hall[2] analyzed the history of influenza in Camp Jackson to discover whether it confirmed or refuted the contention of Lynch and Cummings that unsterilized eating utensils are responsible for influenza and that wherever there is an explosive outbreak in a military command it will be found that unsterilized knives, forks, cups, etc., were in use.

In the commands at Camp Jackson were some which sterilized their mess kits and others which did not. Hall found that the Lynch-Cummings rule did not work. He concludes that it may be true but that other factors may be powerful enough completely to upset it. For instance, in Camp Jackson one command which sterilized

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(9) Military Surgeon, May, 1920.
(1) Amer. Jour. Pub. Health, January and November, 1919.
(2) Military Surgeon, May, 1920.

their mess kits properly had an explosive outbreak with a high prevalence rate. On investigation it was found that this was a command of raw recruits who had arrived from rural districts in the South only a short while before the outbreak of the epidemic.

After-Results of Influenza in Cincinnati. W. H. Peters[3] describes the Cincinnati organization to take care of the aftermath of the 1918 influenza epidemic. The city was divided into thirteen districts. A central health station manned by one physician, one nurse and one clerk was established in each district located generally in a school. During the first four months, 12,772 influenza subjects were listed, 7,058 examined and 5,624 were found to be in need of some medical, surgical or dental service—80 per cent. There were 643 cardiac cases. There was a type of heart irregularity which was due sometimes to myocardial degeneration and sometimes to nervous disturbances. One hundred and eighty-three tuberculosis patients, most of whom attributed their troubles to influenza, were examined.

Influenza and Tuberculosis. J. H. Peck[4] reports the relation of influenza to tuberculosis at Camp Dodge. In the tuberculosis wards when the 1918 epidemic of influenza appeared there were 130 patients. Less than 20 per cent. developed influenza and those had the disease mildly. A comparison of the number of deaths from tuberculosis in twenty-two Iowa counties showed a decrease of 39.2 per cent. when January, 1919, was compared with January, 1918, and of 29.2 per cent. when the respective Februarys were compared.

Vaccination Against Pneumonia. In the *Journal of the American Medical Association,* for Sept. 18, 1920, the following notice appeared:

Preparations for Respiratory Disease Control:—The Surgeon-General of the Army is making preparations for the control of the diseases transmitted by discharges of the respiratory tract and the reduction of their mortality during the coming winter among American troops. Experiments carried on at the Army Medical School on animals indicate that the pneumococcus vaccine produces

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(3) Amer. Jour. Pub. Health, December, 1919.

(4) Jour. Iowa State Med. Soc., February, 1920.

a considerable degree of protection for a short duration of two months. It is recommended to the Medical Corps, therefore, that this vaccine, which is given in three doses like the triple typhoid vaccine, be administered in the Army during the month of December. The pneumococcus vaccine is administered only on a voluntary basis to groups of soldiers who are willing to allow themselves to be vaccinated and observed as to the benefits arising from its use.

Pneumococcus Carriers. Joseph Sailer, M. W. Hall, R. L. Wilson and Charles McCoy[5] investigated the number of pneumococcus carriers in Camp Wheeler, the relation of contact in tents to pneumonia and the efficacy of different methods of sterilizing the nose and throat. They found pneumococci in the throats of 16 per cent. of the entire command. These were distributed among the pneumococcus types as follows:

Carriers, Type IV., 76.58 per cent.; Type III., 4.5 per cent.; Type II., 13.52 per cent.; Type I., 5.4 per cent.

The method pursued was as follows: Swabs from the nasopharynx are spread on blood-agar plates and incubated for from sixteen to twenty hours. Characteristic colonies are planted in Avery's blood-broth medium. The cultures in this are examined by Gram stain, tested for bile solubility and the cultures which qualify are tested with precipitins. It is not feasible to quarantine 16 per cent. of a command. Therefore, various methods of sterilizing the nose and throat were employed. Dichloramin-T dissolved in oil of eucalyptus gave good results, in solution in chlorosane the results were not equally good. Chlorine gas was inefficient and dangerous. Phenol in oil was efficacious, in glycerine it was less so. Iodine in oil gave good results. Quinine proved of no value in cleaning the nose of pneumococci. A group of soldiers who were taking nose injections of quinine solution when the epidemic of influenza struck the camp unanimously escaped the disease. Chloramine-T was found of little value. The authors give preference to oily solutions of phenol and iodine. A striking observation was to the effect that several cases

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(5) Archiv. Int. Med., December, 1919.

of pneumonia not infrequently came out of the same tent; 60 per cent. of the cases occurred in tents reporting more than one case. Eight cases developed among the occupants of a single tent; sixty-six tents furnished no cases; thirty-two tents one case each; seven tents two cases each; five tents three cases each; one tent four cases; one tent five cases; one tent six cases; one tent eight cases. When several cases came from the same tent they were caused by the same type of pneumococcus.

Cerebrospinal Meningitis. M. Aynaud[6] in discussing what the Great War has taught us about cerebrospinal meningitis said that he had been taking care of cerebrospinal meningitis cases for twenty-one years and he had never seen a case, except possibly one, in which contagion was the cause. The disease is spread, he believes, by the healthy carrier of the disease around cases of meningitis. From 2 to 4 per cent. of well persons will be found harboring meningococci, and measures for control of the epidemic must be directed against them.

Control of Meningitis. Arthur Compton[7] found humidity of the air a factor of major importance in the spread of cerebrospinal meningitis. Close attention must be paid to the ventilation of barracks in order to keep the humidity down else the disease will spread. He found only 1 per cent. of carriers among non-contacts in Alexandria, Egypt, as against from 10 to 20 per cent in certain English investigations.

Meningococcus Carriers. D. Embleton and G. H. Stevens[8] examined 905 meningococcus carriers bacteriologically; 9.5 per cent. were case carriers after meningitis and 90.5 per cent. were healthy accidental carriers. The case carriers remained such for five and one-half months on an average. One was a carrier for 634 days. Accidental or healthy carriers remained such for an average of twenty-four days. Of the healthy carriers, 9.3 per cent. were discharged within one week; 24.1 per cent. by the end of the second week; 41.3 per cent. by the end of the third week; 56.6 per cent. by the end of the fourth week; 68.6 per cent. by the end of the

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(6) Prog. méd., Jan. 31, 1920.
(7) Lancet, July 26, 1919.
(8) Jour. Royal Army Med. Corps, 1919, vol. 23, p. 312.

sixth week; 79.9 per cent by the end of the eighth week.

Patients were treated by inhalation chambers, chloramine-T, zinc sulphate, hand spraying with flavin and adrenaline, with chloramine in paraffin, with electrosal, perchloride of iron and mercuric ointment. Nothing seemed to benefit them.

Epidemiology of Tuberculosis. The most radical views on the subject of tuberculosis announced by a recognized medical authority within the last twenty years are those of John Brownlee.[9] He holds that phthisis pulmonalis is not one disease but a group of diseases, there being a similarity to the group of fevers due to infection with the typhoid bacillus and its near kinsman.

He divides the diseases into three types:

1. The young adult type affecting chiefly young adults. The average age at death is 20-25.

2. The middle age type. The commonest age of death of males is 45 to 51.

The old age type, the commonest age at death being 55 to 65.

The present epidemic of phthisis of the young adult type had its maximum somewhere about the middle of the last century. The disease of Type 2 had its maximum fully one hundred years ago. The mean age of death from phthisis is advancing. This is probably due to a subsidence of the prevalence of the young adult type and not due to increase of general resistance to the disease as is generally argued. However, this is a subject to be discussed at length in later publications from the same source.

Incidentally, the committee announces two major discussions soon to follow, to wit: Why the decline in the amount of phthisis pulmonalis during recent years; and the geographical and climatological distribution of phthisis in the British Isles.

Brownlee holds that the young adult type of phthisis is not affected to any considerable extent by environment. The amount of disease of this type in eminently healthy houses is quite surprising. In respect to its failure to

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(9) Special Rep., Series No. 18, Med. Research Com., National Health Insurance, 1918.

respond to environment Brownlee claims that there is a resemblance between young adult phthisis and scarlet fever.

The accompanying table shows that in Glasgow between 1898-1902 the number of cases of scarlet fever in children under 10 per 10,000 child population was greater in the good part of town than in the poor, there being nearly three times as much in the best part as in the worst.

The difference in notification would not account for so wide a variation.

District	Pop.	No. children under 10.	No. persons per room.	No. notif. cases scarlet fever 1898-02.	Attack rate per 10,000 children per year.
1	 34,868	4,451	.5 –1.	864	388.2
2	 83,255	13,605	1 –1.5	2,148	316.6
3	201,098	43,173	1.5 –2.	5,439	251.8
4	 87,885	20,834	2 –2.25	2,184	209.6
5	237,161	56,818	2.25–2.5	5,610	197.
6	117,445	30,185	2.5 –2.75	2,091	138.4

A very interesting discussion secondary to the main theme is that of the relation of certain occupations to tuberculosis. Among workers in silica the death rate from phthisis is high, the maximum being reached in ages 45 to 55. Slate miners and quarrymen show a later maximum. Lead, iron and coal miners show maximum deaths from phthisis at ages 55 to 65. Phthisis is relatively rare among coal miners but the death rate at ages 55 to 65 reaches the level of the rate for all ages. Iron miners of this age have a rate twice the normal and lead miners have one four times the normal. The curve for the miners is difficult to interpret. In fact, Brownlee says, the Cornwall rate seems a contradiction to the rule. When he tries to explain it on the theory that there is some poisoning from the metal or its dust he is upset by the same type of curve for residents of Cornwall not working in the tin mines.

Slate quarriers have a phthisis rate seven or eight times as high as that of other quarrymen. Perhaps this is due to chronic irritation of the lungs from alumina.

The amount of early age phthisis among the bootmakers was regarded as significant until it was discovered that in the cities where bootmaking is a great industry the phthisis is of the early age type even among those in no way connected with the industry. However, in the case of Leicester bootmakers Brownlee attributes some influences to the inhalation of volatile organic substances. All forms of leather workers except tanners have a high tuberculosis rate.

Susceptibility to Tuberculosis. Contrary to the opinion of Brownlee, the human host is the larger factor in determining the epidemiology of tuberculosis and the clinical characteristics of consumption in man, according to S. L. Cummins.[1]

Cummins had at his disposal the tuberculosis rates of various primitive tribes fighting with the allied armies. He also had opportunity to study tuberculosis clinically among these peoples.

Among his conclusions are these:

1. Members of isolated communities where tuberculous disease is rare or absent show in comparison with members of infected communities a marked susceptibility to the disease.
2. The relatively high resistance to tuberculosis infection manifested by the majority of individuals in infected communities is attributed to acquired immunity resulting from previous contact with the disease.
3. The susceptibility of African and other primitive races to tuberculosis is the susceptibility of virgin soil.
4. A theory of ''infection and resistance in mutual interaction'' is capable of explaining the statistical correlations that have been adduced to support the theory of inherited disposition.
5. The phenomena of variation in type, comparative mortality, distribution according to age, sex, locality and occupation noted as characteristic of tuberculosis in a highly organized community, are explainable in terms of infection and resistance.

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(1) Internat. Jour. Pub. Health, September, 1920.

6. Recent statistical investigations support the assumption that mild infections with bovine bacilli may play an important part in raising the general resistance to the human type of the tuberculous disease.

7. One of the results of this increased resistance may be the production of greater chronicity of phthisis pulmonalis, a lengthening of the life of bacillus carriers and excreters in the parental period, and a consequent increase of danger to infants and children.

Symptoms of Tuberculosis. The National Association for the Study and Prevention of Tuberculosis adopted the following standard definitions as a requisite for their experiment at Framingham:

1. Loss of weight. By "loss of weight" should be understood an unexplained loss of at least 5 per cent. below normal limits for that particular individual within four months time.

2. Loss of strength. By "loss of strength" in its pathologic sense is meant undue fatigue and a lack of staying power which are unusual for the individual patient and which can not be satisfactorily explained.

3. Fever. An occasional temperature of 99° F. should not be considered "fever." A temperature which persistently runs over 99.4° F. when taken at least four times a day over a period of one week (by mouth five minutes) should be considered of significance and to constitute "fever."

4. Elevation of pulse. Where the average normal pulse of the patient is already known, an elevation of 15 beats a minute when the pulse is taken quietly at home during various periods of the day should be considered abnormal. In cases in which the average pulse is not known, and of course this constitutes the majority of cases, one should consider an average pulse of 85 or over in men and 90 or over in women to be abnormal. The combination of a subnormal temperature and an elevated pulse as defined here should be considered of great importance.

5. Hemorrhage. Any amount of expectorated blood, with or without sputum, may mean that tuberculosis is present and requires careful and thorough medical investigation as to its source. Blood streaks, blood spots,

etc., may or may not mean tuberculosis. On the other hand a hemorrhage of one or two teaspoonsful is presumptive evidence of the disease.

6. Family history. An occasional case of tuberculosis in the patient's uncles, aunts, cousins, etc., should not be considered of importance, unless there has been intimate exposure and personal contact with such a case. It is an important fact when the patient's immediate relatives such as brothers, sisters, father, mother, or grandparents have been tuberculous, and especially so, when there has been prolonged and intimate contact.

7. Exposure. Childhood exposures are of the greatest importance. Moderate exposure among normal, healthy adults of cleanly habits is of less importance. Of course, prolonged contact, with unhygienic habits or surroundings, may be a dangerous factor at any age.

8. Cough. There is no cough characteristic of tuberculosis. Every cough that persists for six weeks or over requires investigation. Tuberculosis may exist without any cough whatsoever.

9. Sputum. The presence of sputum is not necessary for a positive diagnosis. The constant raising of sputum with or without cough, requires investigation. Absence of bacilli in the sputum after one or several laboratory examinations is not necessarily proof against the presence of active tuberculosis.

10. Hoarseness. Any hoarseness or a persistent "huskiness" requires investigation.

Diagnosis of Tuberculosis. In reporting on the medical aspects of reconstruction, W. S. Thayer[2] makes the statement that in an examination of soldiers invalided home from France on account of pulmonary tuberculosis Lt.-Col. Webb found that only 30 per cent. presented manifestations justifying the diagnosis. This he attributed to a lack of proper knowledge of physical diagnosis and to the habit of accepting the interpretation of a Roentgen-ray plate by a radiologist as evidence of active tuberculosis. A surprising table is one modified from Bridgeman which showed the total average disability in hospital and camp from certain diseases and

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(2) Amer. Jour. Med. Sci., December, 1919.

injuries. Such long periods of convalescence in civilian life would not be tolerated by employers, teachers or parents.

Tuberculosis and Asthma. E. B. Freilich[3] reports thirty-six cases of asthma in which tubercle bacilli were found in the sputum. He says that there is no antagonism between tuberculosis and asthma. Consumptives develop asthma and asthmatics develop consumption. He quotes Soca as having found 500 tuberculous persons in a study of 700 asthmatics and Pottenger as having found seven asthmatics in a study of seventy-five consumptives.

In one dispensary, Freilich found six asthmatics in a group of forty-nine cases of tuberculosis with bacilli in the sputum.

Many physicians neglect to examine the chest or the sputum of asthmatics thinking the asthma a sufficient explanation of the symptoms and consumption in asthmatics scarcely among the possibilities. In consequence, many old asthmatics go around coughing, spitting and spreading consumption for years without any suspicion as to the harm they are doing. Repeated sputum analysis should be made every year in asthmatics to detect tuberculosis before it has been present for a long time. The most common symptoms which suggest consumption in an asthmatic are rapid pulse, loss of weight, pain in the chest, night sweats and hemoptysis.

The Convalescent Consumptive. D. A. Stewart[4] contends that no man is capable of treating tuberculosis who is incapable of regulating the rest and exercise of his patients. If he treats them on the basis of sunshine, open air and feeding and disregards regulations of work he mistreats them. When it comes to training the man with arrested tuberculosis for a life of service the same considerations come into play. The prime consideration is that the cured consumptive shall not be over-worked or over-worried.

The six requisites for successful life after cure as given by Stewart are:

1. His work must not require more manual labor than

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(3) Bull. Chicago Municipal Tuberculosis Sanit., November, 1920.
(4) Amer. Rev. Tuberculosis, June, 1920.

the man can stand without marked fatigue. Right here a great many mistakes are made. Many patients who, prior to the onset of the disease, have lived indoor lives are set at manual labor because it keeps them out of doors.

2. Outdoor work is not essential. If in an arrested case the individual can get outdoor work which lies easily within his strength and otherwise conforms to the rules it is all right, but the advantage of outdoor work is not enough to compensate for broken rules in other directions.

3. Good wages. In the arrested case the individual must afford the food, habitation, environment and rest which his body calls for, and this, too, without the worry of economic maladjustment.

4. He must have a permanent occupation.

5. He must live at his own home.

Stewart discusses the disadvantages of farming, gardening and chicken raising. For most persons with arrested consumption who undertake these occupations, the work is too strenuous and the privations and exposures too great. And, finally, the cured consumptive who prior to the onset of his disease was physically very active must be content to give up something, to yield some of his ambition or some of his keenness for sport. He must "sing a slender song" and be satisfied. If he works and plays as hard as he did before his attack he will again go on the rocks.

Tuberculosis in Women. Investigation of the cause of the increase in phthisis in England since 1914 and especially among women, is the assignment given M. Greenwood and A. E. Tebb.[5]

They were not able to decide whether there had been an increase in tuberculosis among women engaged in the manufacture of munitions. There has been an increase in phthisis mortality in the ages from 15 to 45 since the outbreak of the war. Industrial employment probably increases the tuberculosis rate. Industrial centers will continue to have high tuberculosis rates until the cause is discovered and corrected. In Birmingham,

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(5) Special Report, Series No. 22, National Health Insurance.

the authors found a higher tuberculosis rate among those employed in unhygienic establishments. There was a serious overcrowding in industrial dwelling but there was no evidence of any specific trade habit among munition workers specially apt to favor the conveyance of phthisis from person to person.

Smallpox. Must we prepare for a pandemic of smallpox? This question is asked by W. C. Allen.[6] It has been two decades since epidemics of any proportions swept over the country and while the war resulted in the vaccination of large numbers of young adults the very young are almost unvaccinated, while those of middle life and older have not been revaccinated for many years.

During the last year, smallpox has been prevalent in Canada and Mexico. A. F. Gillihan is quoted as having concluded that smallpox is increasing throughout the world, both as respects incidence and mortality. Allen says that should smallpox become widespread, an increase in the virulence of the disease may be expected with a change from mild to severe forms of the disease. This last is a moot question just now. For instance, King holds that the present mild smallpox is the result of the prevalence of a mild strain and not due to amelioration of a severe type due to environmental influences making for mildness including vaccination. McVail supports the opinion of King while, on the other hand, C. K. Millard upholds the opinion of Allen.

R. Wartz is quoted as saying that smallpox is on the increase in Paris and that 60 per cent. of the hospital patients refused vaccination on the ground that they had been vaccinated in childhood.

Hata of Japan is quoted as having treated cases of smallpox with autogenous serum with excellent results.

Control of Smallpox in Glasgow. Arthur Drury[7] tells us that when smallpox became quite prevalent in Glasgow in 1920, about 50,000 people were vaccinated in one week in Edinburgh and the rush was even greater in Glasgow. We have commented before on the curious anomaly of the so-called conscience which declares vac-

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(6) Modern Medicine, August, 1920.
(7) Medical Officer, July 10, 1920.

cination to be prejudicial to health when danger is distant but is suddenly stifled when danger threatens. There is something distinctly cowardly in the gross and perverted attacks on vaccination as being useless and harmful among those who clamor for the boon as soon as the danger signal appears.

Chickenpox and Herpes Zoster. E. L. McEwen[8] reports the case of a physician who developed varicella five days after the onset of a herpes zoster. The herpes was typical as to the neuralgic pain preceding and accompanying the eruption, as to the appearance and distribution of the vesicles and pustules and the glandular enlargement.

While this disease was at its height, a typical varicella appeared. Ten days after the onset of the varicella the patient's 3-year-old child abundantly exposed developed varicella but without the herpes zoster.

Low is quoted as having published in the *British Medical Journal,* Jan. 25, 1919, over fifty cases found reported in the literature.

Cases of herpes zoster and varicella in association are classed in four groups:

1. Herpes zoster in one patient followed by varicella in others who were exposed. This is much the largest group.
2. Herpes zoster in one patient followed by varicella in the same patient not followed by varicella in others who were exposed.
3. Herpes zoster in one patient followed by varicella in the same patient followed by varicella in others who were exposed. McEwen's case belongs in this group.
4. Varicella in one patient followed by herpes zoster in others who were exposed.

This interesting association is suggestive from both the clinical and the public health standpoint.

James Taylor[9] discusses the same subject. In all the cases coming to his attention there had been herpes in adults followed by varicella in children who had been exposed—Group 1 of McEwen's classification.

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(8) Archiv. Dermatol. and Syph., August, 1920.
(9) Brit. Med. Jour., Sept. 19, 1920.

Typhoid in the Unvaccinated. One of the most interesting and illuminating studies of typhoid fever in the vaccinated was that made by Victor C. Vaughan, jr.,[1] just before the untimely death of this brilliant son of a brilliant father.

Vaughan closely studied 270 cases of typhoid fever occurring in soldiers of the A. E. F. in the latter part of 1918 and early in 1919. During the same period there were reported to him twenty-three cases of paratyphoid *B.* and nine of paratyphoid unclassified. Among the troops of the other allies there was more paratyphoid than typhoid. The incidence of typhoid in the A. E. F. was 0.1 per cent. as compared with 20 per cent. in the Spanish-American War.

Vaughan's conclusions are: Clinically, typhoid in the vaccinated is the same disease as typhoid in the unvaccinated. He does not agree with Gay that it runs a milder course. The mortality was 11 per cent. Patients infected within eighteen months of vaccination had a mortality rate of less than 10 per cent. Those infected later had a higher rate.

Paratyphoid could not be diagnosed from typhoid except by microscopic, serologic and bacteriologic tests. It is probable that a large number of vaccinated persons became infected with typhoid and had some form of mild disorder which did not cause them to reach the hospitals and was not diagnosed as typhoid. The possible explanations of these seeming failures of vaccination are as follows:

1. Some persons who were injected did not react and were not therefore vaccinated in a proper sense. About the only test we have for efficacy of vaccination is titer of agglutinims but agglutinim titer is not a measure of immunity.

2. Possibly occasional new strains of *B. typhosus* are encountered—strains against which there is no adequate protection. These two arguments are speculative.

3. It is possible that among the millions vaccinated some were overlooked entirely and some escaped vaccination for other reasons.

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(1) Jour. Amer. Med. Ass'n., April 17, 1920.

4. The probable explanation in most cases is the intake of overwhelming doses of bacilli. The disease mounted especially in those commands in combat many of whom drank water from shell holes and other badly polluted supplies. As Bernard says: Vaccination raises against the typhoid bacillus a great barrier but not an insurmountable one.

5. Backhanded typhoid. Somewhere about 60 per cent. of 104 cases investigated reported that they had suffered from diarrhea for several weeks before they developed typhoid. Vaughan's explanation is that these men swallowed typhoid bacilli which were thrown into the bile by the liver. The bacilli lived in the gall-bladder multiplying there and causing a diarrhea. After the soldiers had been worn down by fatigue, hunger or diarrhea they became infected from the bacilli in their own gall-bladders.

6. Some men did not get the full number of doses of vaccine.

Vaccination Against Typhoid. That anti-typhoid vaccination was effective in the prevention of typhoid fever in spite of the fact that it was given in the main by men untrained in its use is proved by F. F. Russell.[2] The number of cases in the army in 1917 was 297 and in 1918, 768; and the number of deaths was twenty-three and 133 respectively. During the two years four million men were in the army. There was one case to every 3,756 men as compared with one case to every seven men in the Spanish-American War. A comparison between the army and the civilian rate among the population 20 to 29 years of age shows in 1917 a rate per 1,000 of 0.03 in the army and 0.11 among civilians; and in 1918, 0.05 for the former and 0.09 for the latter. This is the first time a large American army in the field has ever had a typhoid rate lower than that of the civilian population. An investigation of the cases of typhoid showed that some men had not been vaccinated, some developed the disease soon after entering camp and many had the disease in spite of vaccination.

A study of an epidemic of water-borne typhoid in

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(2) Jour. Amer. Med. Ass'n., Dec. 20, 1919.

Hawaii in the autumn of 1917 showed that the morbidity rate was over four times as high and the mortality rate over eight times as high among the unvaccinated as among the vaccinated. There were fifty-five cases of typhoid among 4,087 vaccinated who drank the infected water as compared with forty-five among 812 unvaccinated. With the exception of 1916 there has never been much paratyphoid in our army as well as we can judge in this late day.

Typhoid in South Carolina. The experience of South Carolina, according to L. A. Riser,[3] shows how easily typhoid fever can be materially lessened. Between 1915 and 1919 the typhoid death rate of the state fell from 35.2 to 21.7. Darlington County has had a whole-time county health officer for two years. The typhoid rate has decreased 57.9 per cent., while the Florence County rate has increased 6.9 per cent., that of Chesterfield County, 33.3 per cent. and of Marlboro County, 50 per cent. Orangeburg County has had a 40 per cent. decrease. They have a whole-time county health officer. Of the surrounding counties without whole-time county health officers Dorchester has had a 20 per cent. decrease, Bamberg 16 per cent., Barnwell no change, Aiken a 25 per cent. increase and Clarendon 116 per cent. increase. The results achieved are due to educational work and the building of sanitary privies.

In the discussion, Dr. W. S. Leathers told of one county in Mississippi where a campaign of education and privy building reduced the number of cases of typhoid from 250 to 50.

Typhoid in Massachusetts. T. O'Donnell[4] informs us that the Massachusetts typhoid death rate declined from 12.2 in 1910 to 4 in 1918 and the typhoid morbidity rate from 102.1 to 27.2 in the same period. In that state flies, food (exclusive of milk), privies and sewage are a small factor in causing typhoid. No municipal water supply is considered dangerous and water is not much of a menace. Milk was responsible for 8.1 per cent. of the typhoid. Contact is the most im-

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(3) Jour. Amer. Med. Ass'n., June 12, 1920.
(4) Amer. Jour. Pub. Health, September, 1920.

portant cause. Carriers were proved to be responsible for 41.5 per cent. of the milk-borne typhoid.

Typhoid Carriers. S. H. Osborn[5] reports that in 1919 there were only 103 deaths from typhoid in Massachusetts, a rate of 2.6 per 100,000. This is a phenomenally low rate for a state. Of the 940 cases reported to the state health department 913 were investigated. The source of infection was discovered in 26.6 per cent. of the cases. Water was not responsible for many cases; thirty-eight were infected by municipal supplies; eighteen by springs and nineteen by wells; fifty-six were infected by milk. Food other than milk is undoubtedly one of the chief factors. Direct contact with cases of typhoid was responsible for 123 cases. Certainly less than 5 per cent. of the cases were due to flies.

The intermittent typhoid carrier is probably the greatest single factor in the causation of typhoid in Massachusetts today. There was not much seasonal variation in typhoid in 1919. In August, September and October the average number of cases reported in a month was 145. In the remaining nine months it was fifty-six. The morbidity rate was 23.7 per 100,000. The case fatality rate was 11 per cent.

Sources of Typhoid Infection in Massachusetts. As typhoid fever diminishes in Massachusetts the state health department finds it increasingly possible to ascertain the sources of infection. They find that more than half the typhoid in that state is contracted from carriers. There are now fifty-one carriers known in Massachusetts; thirteen of these were located in 1919; three said they had never had typhoid. Of the Massachusetts carriers, one has a carrier forty-four years and three others twenty, eighteen and sixteen years respectively. S. H. Osborn and E. A. Becklan,[6] who are responsible for the above opinions, hold that once a carrier always a carrier. Of the infections by carriers, 41 per cent. were through milk, 35 per cent. through foods other than milk; two nurses were found to be carriers. Only 13.2 per cent. of the cases were due to contact with cases of typhoid.

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(5) Modern Medicine, September, 1920.
(6) Jour. Infec. Dis., August, 1920.

Typhoid Bacilli in Urine. H. J. Goeckel[7] obtained typhoid bacilli in the urine of patients suffering from fever caused by these organisms. The organisms were identified by agglutination tests with known serums. He offers the method as being of service in diagnosing typhoid and paratyphoid fever in the early stages of the disease. It requires less time than blood cultures and is more certain. It is helpful in persons vaccinated against typhoid and paratyphoid.

Dysentery in France. G. E. Stookey[8] reports an epidemic of dysentery due to *B. dysenteriae*, Flexner type, in a French village in August, 1918. There were twenty-seven cases and nine deaths. Investigation showed that a portion of the town water supply had been infected from a latrine located on the road side. This had been closed and filled for several weeks at the time of the epidemic. The water main ran about 15 feet away from the latrine and 16 feet down the hill from it there was a break. A branch line which ran just behind the latrine was leaking and the out-flowing water seeped through and around the latrine to the break in the water main.

Dysentery Carriers. W. M. Fletcher and D. L. MacKinnon[9] give the following conclusions of an exhaustive study of dysentery carriers among British troops, a majority of whom had seen service abroad. Of the dysentery convalescents examined, 6.95 per cent. were carriers of dysentery bacilli, 5.56 per cent. were Flexner carriers and 1.39 Shiga carriers. Of the non-dysentery convalescents 1.06 per cent. were carriers, all Flexner.

In the main the Flexner carriers were from France, the Shiga carriers from Egypt. Flexner carriers were generally intermittent carriers.

Control of Leprosy. J. D. McDonald[1] reports that since December, 1918, seventy-eight lepers have been paroled from Kalihi hospital as free from evidence of leprosy and that not one has had a recurrence of the disease. The treatment consists of injections into the

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(7) Jour. Lab. and Clin. Med., August, 1920.
(8) Jour. Infect. Dis., October, 1919.
(9) Special Rep., Series No. 29, Med. Research Com., Nat. Health Insur.
(1) Jour. Amer. Med. Ass'n., Nov. 27, 1920.

muscles of the ethyl esters of chaulmoogra oil. These esters are prepared after the method of A. L. Dean. To the chaulmoogra oil preparation a certain proportion of iodine is added. In addition the oil preparation containing iodine is given internally.

The treatment can not be given at home or anywhere else except in a well-controlled hospital. The laws of Hawaii provide that every leper must be reported and registered when they are taken into Kalihi hospital, an institution having 150 beds and located on 5 acres of ground. If at the end of six months they seem to be incurable they are sent to Molokai, there to remain until death.

The reputation of Kalihi for cures is causing hidden lepers to surrender themselves voluntarily and to come out for cure.

Just one point as to the clinical side of leprosy: In the course of the disease there are periods of leprosy fever. During such attacks the patients are decidedly ill. During this fever there develop papular eruptions like those of the secondary stage of syphilis. This eruption and fever are due to a sort of toxemia due to the liberation of toxins into the blood stream by the bacilli and they are much more liable to develop as the disease lessens rather than during its progress. In order to establish a diagnosis and forcibly to hospitalize it is not necessary to find the leprosy bacillus. Diagnosis can be made on the clinical symptoms without the support of laboratory demonstration. A cure based on a negative finding of leprosy bacilli in tissues is apt to be misleading. In examining tissues one is more liable to find bacillary detritus than the entire bacillus.

Malaria. H. W. Hovenberg[2] as a business man is an ardent advocate of eradication of malaria as a business proposition. As a sanitarian for a railroad running through southwestern Texas he has had reason to come to this conclusion. One-third of the admissions to hospital of employees on the St. Louis & Eastern R. R., and one-third of the money spent for medical relief are by reason of malaria. Each railroad employee in the

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(2) Southern Med. Jour., June 20, 1920.

hospital costs $50 on the average. At that the chief item of expense to the railroad is the man who is ill but who keeps at work.

A federal railroad manager said the railroad expenditure for malaria would be justified if they prevented one case of malaria for each 10 miles of track. Of the malaria among railroad employees, 90 per cent. is among the section men, extra gang men, bridge and work crews and shop men. The section men comprise 20 per cent. of the railroad force and have 25 per cent. of the malaria. The extra gang men make up 10 per cent. of the force and they furnish 25 per cent. of the malaria. The bridge work train and water train crews, furnish 5 per cent. of the men and 15 per cent. of the malaria. The shop men furnish 20 per cent. and 10 per cent. respectively.

To prevent malaria in section hands the following suggestions are made:

(a) Screen all section houses.
(b) Furnish 16-mesh wire at cost to ordinary houses.
(c) Furnish quinine free.
(d) Eliminate mosquito breeding places by drainage, weed cutting and oiling.
(e) Conduct educational campaigns.

To prevent malaria on bridge and work trains:

1. Screen all bunk cars.
2. Train the men to swat mosquitoes.
3. Spot the cars in safe localities.
4. Furnish free quinine.
5. Conduct educational campaigns.

In the discussion H. R. Carter said that in Virginia one-half of the malaria in the civil population is caused by railroads. Mosquitoes breed in burrow pits, along right of way, in marshes caused by railroad interference with natural drainage, through the agency of half-cured section hands and bridge crews and by transporting infecting mosquitoes in trains.

In the discussion of methods for the community control of malaria which ran in the *Southern Medical Journal* for several months in the Spring of 1920, H. A. Taylor[3]

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(3) Southern Med. Jour., May, 1920.

advocated minor drainage, weed cutting and oiling as measures for the control of malaria. In a demonstration of malaria control in Arkansas in a district where 9,980 adults lived, the cost of reducing malaria 88 per cent. was 84 cents *per capita.*

Malaria and Farming. D. L. Van Dine[4] says that the loss in crop returns around Mounds, La., by reason of malaria amounts to $3.88 an acre a year. It costs $17 an acre to bring a piece of swamp land under cultivation in the malaria district. The cost of malaria to the acres under cultivation is sufficient to bring under cultivation in five years an equal amount of uncultivated undrained land.

Malaria-carrying mosquitoes do not breed much in water barrels, stock troughs and cisterns. They do breed profusely in the margins of bayous, swamps and shallow lakes, woodland pools, shallow water filled with vegetation and open water with logs, stumps, brush or with the surface covered with floating trash. Anopheles when hungry will bite at any hour of the day or night.

While screening, properly done, is an effective protection it is seldom done effectively. Screening many cabins would require that they be rebuilt. The individual use of mosquito bar over beds he thinks is more effective.

Wickliffe Rose[5] gives his valuation of the different methods of malaria control as follows:

1. For the average town in our Southern states having a thousand or more inhabitants and a reasonably high infection rate, malaria control by anti-mosquito measures is economically feasible; it is, in fact, a sound business investment.

SUMMARY OF RESULTS OF MALARIA CONTROL DEMONSTRATION IN SUNFLOWER COUNTY, MISS., 1918

Population rural area	8,000
Estimated degree of control	80%
Per capita cost	$1.08
Per capita cost for Ruleville	$ .41

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(4) Amer. Jour. Pub. Health, February, 1920.
(5) Jour. Amer. Med. Ass'n., Nov. 8, 1920.

2. In heavily infected regions, in which the cost of mosquito control would be prohibitive, the amount of malaria may be greatly reduced by resort to screening, to immunizing quinine, or to destroying the parasites in the blood of the human carriers. The indications would seem, in fact, to justify the hope that by the systematic application of these measures the malaria in a community may be held within reasonable bounds, and that this result may be accomplished within limits of cost that the average community may well afford.

3. The people in these communities are prepared to provide the funds by public taxation for malaria control when they have been shown by demonstration that the program proposed will accomplish definite results that justify the expenditure.

4. The results thus far accomplished would seem to justify continuing these field experiments until the principal procedures that have been found useful in controlling malaria have been pretty thoroughly tested separately and thus evaluated. It will then be possible to operate intelligently a combination program in which each control measure will be given its place and will receive varying emphasis from time to time according to the local conditions that have to be met. This freedom in the use of our tools will in turn contribute toward the object that we have in view, namely, the highest degree of malaria control consistent with a reasonably low *per capita* cost.

Malaria and Mosquitoes. Bruce Mayne[7] found that people infected with malaria, whose blood contained gametocytes infected mosquitoes even after taking as high as 480 grains of quinine. This supports the observation of Darling. A patient who had taken 480 grains of quinine was bitten by a mosquito. The organisms underwent their normal development in the mosquito. After the proper time this mosquito was permitted to bite a man whereupon the bitten man developed malaria.

Malaria infeted mosquitoes are not short lived. Roubaud saw an infected mosquito live in good health for 125 days. Mayne kept one such specimen alive 185 days and

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(7) Pub. Health Rep., July 9, 1920.

another alive 158 days. The fact that malarial organisms are present in mosquitoes does not seem to interfere with their good health. On the contrary, mosquitoes infected with filaria sicken and die after a brief illness.

The sexual forms of the malarial plasmodium do not develop until the malarial infection has persisted for from eight to fifteen days in the case of subtertians and for from seven to ten days in tertian and quartan malarias.

To infect a mosquito, Darling demonstrated that the blood must contain one *Plasmodium falciparium* for 500 leukocytes. Mayne says that to infect with *Plasmodium vivax* there must be one organism for every 650 leukocytes. *P. vivax* is much less resistant to quinine than is *P. falciparium.*

Controlling Rural Malaria in Summer. C. W. Metz[8] thinks malaria essentially a rural problem. Under present conditions proper draining and oiling is not economically practicable; nor can screens be effectively used in the present rural homes. There are practical difficulties in the way of thorough treatment of malaria hosts.

The focal point of danger is the farmhouse itself. Infection of mosquitoes by men and of men by mosquitoes takes place mainly indoors. In general, the only dangerous mosquitoes are those in or near dwellings. With these conclusions in mind, Metz experimented with various forms of mosquito traps. He noticed that mosquitoes were fond of hogs. Based on this observation he built several small pig houses as mosquito traps. A trap was 3 feet high and 5 feet long with no floor; there was one door. Along both sides and the rear there was a long slit for mosquitoes to enter. This was 8 inches wide at the outside and tapered to a one-inch slit at the inside. It was made of screening. The mosquitoes entered the house lured by the pigs. Having fed they showed a disposition to stay around. In a brief and uncontrolled experiment it seems to Metz that five or six such pig houses kept the nearby homes fairly free from mosquitoes. Metz suggested that experimenting be

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(8) Pub. Health Rep., Aug. 20, 1920.

done to discover some inanimate bait attractive to mosquitoes.

Malaria in the South in Summer. The malaria rate among the adult negroes in the farming regions of the South always rises rather abruptly in midsummer according to Dr. Henry Thibault.[9] That of the negro children rises or does not according to whether the season is wet or dry. In July and August, the plantation negroes hold revival meetings lasting from two to four weeks. The churches are nearly always located among trees and near underbrush. Mosquito-breeding water was found within 200 yards of each of 194 churches examined by Thibault. During a revival every adult negro goes to church every night and if he has had a chill, fever and sweat during the day he is all the more anxious to go. The churches are always infested with mosquitoes and they are never screened. Since the meetings last two weeks and longer, the mosquitoes not infected before the meeting have time to become infected and capable of spreading infection before the meeting is over. In dry seasons there are generally no mosquito breeding places near the cabins and the infected adults do not infect the children. This is otherwise in the wet years.

Thibault's article carries tables covering each year between 1913 and 1918 and showing the sudden increase of malaria during the revival season and also the relation of the child malaria rate to the rainfall during the summer months.

Malaria in Rural France. E. Roubaud[1] says that *Anopheles maculipennis* is found all over the Department of La Vendee. In the pastoral tracts, the adults feed on the cattle and seldom touch human beings and malarial fevers practically do not exist. In the marsh tracts, there are but few cattle and the mosquitoes bite humans coming into the houses in swarms at night and malaria abounds. He suggests the organization of animal prophylaxis in highly malarial sections as a means of combatting malaria. Animal stables might be devised to serve as giant mosquito traps.

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(9) Jour. Ark. Med. Soc., April, 1920.
(1) Ann. de l'Inst. Pasteur, April, 1920.

Malaria in England. B. Blacklock and H. F. Carter[2] having infected *Anopheles plumbeus* with malarial parasites think that there is danger that England may be somewhat overrun by malaria due to infected returning soldiers. This mosquito is a wild tree breeding variety rather widely spread over England.

Typhus Fever. S. C. Wolbach, J. L. Todd and F. W. Palfrey[3] say that in lice fed upon typhus patients a peculiar pleomorphic microörganism is constantly present. The organism is Rocha Lima's *Ricksettsia promzeki.* In the vascular lesions of animals infected with typhus this same organism was found.

R. P. Strong, writing in the same publication, thinks that while it is reasonably certain that most of the typhus fever is spread by lice "there have been no scientific and properly controlled actual experiments performed upon human beings which demonstrate that typhus is transferred by lice." Nevertheless he is in favor of that method of attack. He says: "It must be borne in mind that this does not exclude the possibility in exceptional instances of infection by other means."

Of the bacteriology of typhus he says: "Until further experimental work is performed the etiology of this disease must be regarded as still undetermined." He thinks that in Poland typhus is beyond the control of the local authorities and since this disease is costing the world more than it would cost to eradicate it, he favors a combined effort by all civilized nations to eradicate it.

Typhus Control in Serbia. R. P. Strong[4] in writing of the control of typhus in Serbia does not agree with G. A. Soper and others that control of a nation-wide epidemic is impossible and that amelioration only comes by growth of general intelligence. He says: "It was argued that in order to exterminate typhus from Serbia it was necessary to uplift the whole race of Serbian people and to change their entire habits and methods of living and this would take years to accomplish. I am not in agreement with this idea."

In Serbia with the crudest of makeshifts and without

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(2) Ann. Trop. Med. and Parasitol, March 15, 1920.
(3) Internat. Jour. Pub. Health, September, 1920.
(4) Ibid., July, 1920.

change in the habits of the people typhus was quickly brought under control. To destroy lice and eggs, heat was best when it was available. Petroleum was very effective. Sulphur fumes were effective when from 5 to 8 pounds per 1,000 cubic feet of air were burned. Crude naphthalene was fairly satisfactory.

Rocky Mountain Spotted Fever. An extensive article on Rocky Mountain spotted fever based on considerable research as well as an extensive review of the literature and accompanied by a comprehensive bibliography is that of B. F. Wolbach.[5] Wolbach was invited to study this disease by Dr. Cogswell, secretary of the Montana State Board of Health.

In all probability the Indians suffered somewhat from this infection. Cases have been reported from Washington, Montana, Idaho, Oregon, Wyoming, Nevada, California, Utah, Colorado and South Dakota. A peculiarity of the disease is the great difference in its virulence in different sections. For instance, it is much more virulent in western Montana than in the eastern part of the state. That it does not spread over a larger section of the country is because the ticks which carry it are carried by small animals such as rabbits and these remain local. They get on cows and other large animals early in the season but before the shipping time has arrived they are gorged with blood and have fallen off and burrowed into the soil. The ticks have been found in Washington, Montana, Oregon, Idaho, Wyoming, Nevada, Utah, Colorado and New Mexico. The virus of the disease is carried by ticks and these transmit it to their eggs. In fact they have been found in the male and female sexual elements. It is truly an hereditary disease in ticks. No mammalian animal has been proved to be susceptible to the disease except man. That the microörganism *Dermacentroxemis rickettsi* is responsible for the disease Wolbach argues because of its constant presence in persons sick with the fever, its presence in infected ticks and in their eggs and its absence from more infected ticks.

The organism is minute in size and difficult to classify.

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(5) Jour. Med. Research, November, 1919.

It is not a protozoon or a bacterium. It has not been cultivated. There are three types of the parasite. The disease Wolbach terms an acute specific endangitis with toxemia. It is clinically and otherwise rather closely related to typhus fever.

Yellow Fever in Ecuador. G. E. Vincent[6] tells us that since May, 1919, not a single case of yellow fever has occurred at Guayaquil, Ecuador. The year 1920 has witnessed a recrudescence of yellow fever in many places from which the disease had not been reported for several years, but Guayaquil for the first time in seventy-five years has been free.

[This supposed natural last stronghold of yellow fever has been freed from the disease by the carrying out of the plans of the Gorgas Commission.—Ed.]

W. Pareja[7] states that the yellow fever of modern times was introduced into Ecuador in 1842. It found the entire population non-immune and caused a fearful loss of life. Since that date the disease probably has never been absent from that country and Guayaquil appears now to be the only important focus of yellow fever on the globe. He thinks the organism described by Noguchi is responsible for the disease.

Efforts to bring the disease under control consist in placing all suspicious cases behind metallic screening and, if a diagnosis of yellow fever is made, removal to an isolation hospital; and division of the city into small districts, assigning an inspector to each and requiring the inspector through visits at intervals of less than a week to see that all places where mosquitoes could breed are kept effectively screened. This especially applies to water containers.

The deaths from yellow fever in the first five months of 1919 were: January, eighty-five; February, forty-three; March, seventeen; April, three; May, one. In the preceding Mays there were twenty-two and fourteen deaths respectively.

Yellow Fever in Guayaquil. The last case of yellow fever in Guayaquil occurred in June, 1919. The usual

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(6) Public Health and Education in Many Lands: The Rockefeller Foundation, 1920.
(7) New Orleans Med. and Surg. Jour., November, 1919.

epidemic conditions reached their maximum in December, 1918. There was a slight decline in January. That of February reached 50 per cent. The March rate was about 40 per cent. of that of February. There were practically no cases in April and May.

M. E. Conner[8] shows how this drop followed the screening of domestic fresh water containers. The commission having determined that the household water containers were the principal breeding place for stegomeyia Dr. Conner began at once to make such containers inaccessible to mosquitoes. Within two weeks 2 per cent. of these containers had been covered. By the end of the fourth week a reduction of 36 per cent. had been made. By Nov. 25, 1918, practically 100 per cent. were mosquito proof.

The effect on the prevalence of yellow fever was noticeable about sixty days after the suppression of breeding places became fairly considerable. About two months after all the containers had been covered the number of yellow fever cases dropped to three a month. It was plain that the effect of "other breeding places" at least as to stegomeyia in Guayaquil was negligible. The domestic fresh water tanks were screened. For the suppression of mosquitoes in other breeding places fish were frequently employed. In places where they suited they were efficacious.

Conner says that yellow fever has been eradicated from Ecuador. The only endemic center in that country was Guayaquil and mosquito proofing of the fresh water tanks in that city served to eliminate the disease within four months.

Elimination of Yellow Fever. H. R. Carter[9] thinks the International Health Board plan for the elimination of yellow fever from the earth is entirely feasible. This opinion is based upon a study of the mechanism of the spontaneous elimination of yellow fever from certain centers in Central and South America.

The factors bringing this about have been: (1) Diminished trade and commercial importance; (2) substitution of steam vessels for sailing vessels; (3) withdrawal

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(8) Jour. Amer. Med. Ass'n., Oct. 30, 1920.
(9) Ann. Trop. Med. and Parisitol, March 15, 1920.

of garrisons from the Caribbean lands, and (4) extinction of the great permanent foci at Havana, Vera Cruz, Panama and Rio.

The main factor operating in all these cases is the lessened influx of susceptible individuals. Carter contends that whenever such income stops the disease dies out without sanitary work or diminution of the stegomyia. In communities where there is immigration or travel by susceptible people sanitary work and mosquito control must be carried out to eliminate the disease. He does not subscribe to the theory that either man or a lower animal is a residual host for yellow fever. In the case of malaria, human beings do serve as residual hosts. In consequence the natural method of controlling that disease is by mosquito prevention, principally by drainage as distinguished from yellow fever where the natural method is by control of immigration or other influx of susceptibles.

[This philosophizing by Carter is suggestive for the eventual elimination of certain other diseases.—Ed.]

Dengue. The discovery by Noguchi of *Leptospira icteroides* as the probable cause of yellow fever inspired C. F. Craig[1] to suggest that a spirochete is responsible for dengue—a near kinsman of yellow fever. That the disease is closely akin to yellow fever clinicians have long recognized. The plasmodium of Graham has not been found in the blood by other investigations. However it is established that a filterable virus present in the blood is the cause. The incubation period varies from four to fifteen days. It is transmitted by *Stegomyia fasciata* and possibly also by *Culex fatigans.*

Pneumonic Plague in Oakland. W. H. Kellogg[2] reports an epidemic of pneumonic plague in Oakland, California, in August, 1919. This is the first report of this disease on this hemisphere.

A man supposed to have been infected from a squirrel became ill on August 15. He had non-suppurating buboes which were not accounted for and later developed an atypical pneumonia from which he died on the fifth day of the disease. The diagnosis was influenza-pneu-

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(1) Jour. Amer. Med. Ass'n., Oct. 30, 1920.
(2) Special Bull. No. 34, Calif. State Board of Health.

monia. A man living in the house with this man took sick with a disease diagnosed as influenza-pneumonia on August 25 and died on August 29. The third group consisted of five cases diagnosed influenza-pneumonia; four of these patients died. In the fifth group there were seven cases, all fatal. When the fifth group began to develop the authorities made an investigation which proved that one of the patients had pneumonic plague and which indicated almost certainly that all the others had it except possibly one case.

The three earliest cases were not hospitalized or isolated. Of the third group four were hospitalized during the latter portions of the illness. The seven patients in the last group were completely isolated as soon as the communicable nature of the illness was determined. Complete isolation checked the epidemic at once.

Clinically, pneumonic plague differs from ordinary croupous pneumonia in several particulars. There is very little dullness on percussion and few of the physical signs of pneumonia. The sputum speedily becomes bright red and is never the rusty sputum of pneumonia. Generally bipolar-staining plague bacilli are very abundant in the sputum. Herpes of the lips is never observed. Rarely are there definite chills. The temperature and pulse mount rapidly. A septicemia generally develops. In many cases bipolar bacilli can be demonstrated in blood smears.

Epidemic pneumonic plague is never present except in the winter and in cold climates. In Manchuria 50,000 individuals with this disease died within three months. The temperature was around 30 below zero. Kellogg thinks that the bacilli responsible for pneumonic plague are spread by droplets. In warm weather droplets dry quickly and the bacilli are killed. In cold weather they do not dry so quickly. He says that endemic prevalence of plague among ground squirrels of California constitutes a permanent menace not only to the state of California but to the whole of the United States. The pneumonic type of plague is probably not a serious menace on the Pacific Coast owing to climatic conditions but could readily become a serious matter in other parts of the United States by extension from the Pacific Coast under the proper climatic conditions. He advocates an aggressive campaign to rid California of all infected wild animals within two years.

Plague probably entered California in 1899. The first case was recognized in 1900. Control of the disease was neglected for several years. In 1907 there was a second outbreak of human plague. Then began a campaign to exterminate all infected animals in San Francisco and to rat-proof all new buildings and many old ones. However, the disease meanwhile had broken out among small wild animals in the rural districts. It has smouldered in these foci since that date occasionally resulting in a case of human bubonic plague.

Plague Control. F. Simpson[3] writes that real progress in the control of plague began in 1908 at which date it had been proven that bubonic plague is primarily a disease of rodents transported by the rat and transmitted by the flea; that the disease is rarely transmitted in any other manner; that there is a seasonal increase in fleas and that this increase is followed by an increase in rodent plague; and that at a temperature above 95°F. fleas cease to multiply and the infective microöganisms disappear from their bodies. Hence epidemics are seasonal in occurrence, are confined to warm latitudes and decline when the temperature rises above 85°F.

The number of vessels reporting plague aboard from April, 1919, to August, 1920, was eleven with a total of forty-six cases and twelve deaths. All these vessels were steam propelled. The gaseous agents now used for fumigating vessels to rid them of rats are sulphur dioxide and hydrocyanic acid. Sulphurous acid is the more generally employed but it is so harmful to structures and furnishings that it is being replaced by hydrocyanic acid. The best rat trap is the official snap trap; 20-inch wire cage traps are also used successfully. The fundamental necessity for plague control is war against rat breeding and rat feeding. Human beings are of minor importance as agencies for spreading plague.

Plague in Rodents. C. L. Williams[4] discussing the diagnosis of rodent plague tells us that it is often pos-

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(3) Amer. Jour. Pub. Health, November, 1920.
(4) Ibid.

sible to make a diagnosis without laboratory assistance. This is safe enough in most cases if the examiner has seen many plague-infected rodents. Where laboratory diagnosis of the first case has been made clinical diagnosis of subsequent cases infected by material taken from cases in contact with known cases is generally safe enough.

No description of lesions can ever be graphic enough to make a man without practical experience certain of his diagnosis in the absence of a positive laboratory finding. The Hygienic Laboratory of the Public Health Service has a small number of preserved specimens to be loaned to persons who must pass on such cases and have had no opportunity to see fresh tissues from known cases of rodent plague.

Bacillus pestis is easily recognized in smears and in cultures on slightly alkaline agar, broth, litmus, milk and agar containing from 2.50 per cent. to 3 per cent. salt. The five cardinal signs of acute plague in rats are: Injection, bubo, granular liver and pleural effusion. Injection occurs in about 75 per cent. of all acute plague-infected rats. The injection is apparent over the entire skin and also in the muscles and viscera. There is an increased amount of fluid in the tissues. Around the chest wall there is a gelatinous edema. The characteristic bubo consists of one or two, rarely more, enlarged caseous lymph glands buried in inflammatory, often gelatinous connective tissue. To be characteristic the glands must be injected, inflamed and caseous. In New Orleans, the distribution of the buboes were cervical 28 per cent., axillary 23 per cent., inguinal 43 per cent., and pelvic 6 per cent. In San Francisco 75 per cent. of the buboes were in the groins. In India 85 per cent. of infected rats had buboes, in San Francisco 40 per cent., in New Orleans 33 per cent.

It is difficult to describe the granular liver. The liver is enlarged, injected and with pin-point granules appearing in from 60 to 70 per cent. of cases. The enlarged spleen present in from 60 to 70 per cent. of acutely infected rats is best described as a ''plump dark spleen.'' A clear, copious serous effusion in the pleura is more easily recognized but it is not so dependable a sign since it is not found in a large proportion of the cases. It was present in only one-half of the infected rats found in New Orleans.

Plague in guinea-pigs is characterized by a bubo that is considerably larger than that of the rat. The bubo is definitely caseous. The most definite sign in the guinea-pig is the much enlarged dark spleen with its abundant whitish granules.

Plague at New Orleans. M. S. Lombard[5] reports on the recent small epidemic of plague at New Orleans. Up to Dec. 5, 1919, eleven cases had been discovered. Two persons were dead when first seen, two died in hospitals, three recovered and four were under treatment when the report was made. Since the outbreak began, 22,899 rats have been trapped; 174 have been proved to be plague infected and 700 others are under suspicion.

Rat proofing has been going on for five and one-half years and yet the Dock Board, a railroad and some individuals have been found remiss. Cyanide is regarded as the most effective agent for killing rats in houses.

Prevention of Tetanus. Bruce,[6] as a result of a study of tetanus as it showed itself in British troops in home hospitals during the Great War, is of the opinion that the use of tetanus antitoxin as a preventive is of great value but when it comes to its curative powers he is not so certain.

The total number of British wounded during the course of the Great War was 2,032,142. Of these, 2,385 developed tetanus, a rate of 1.17 per 1,000 wounded. The tetanus rate among the wounded in the home hospitals was 1.2 per 1,000. There were 1,458 cases of tetanus treated in the home hospitals and this report is based principally on a study of those cases.

The tetanus rate was at its maximum in the early months of the war. It was 3.7 in August of 1914 and 9 in September of that year. After that it became possible to supply tetanus antitoxin and to use it for vaccination purposes. Likewise the custom of cleaning wounds better and dressing them open came into vogue. By December, 1914, the tetanus rate had fallen to 1.4

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(5) New Orleans Med. and Surg. Jour., March, 1920.
(6) Jour. Hygiene, July, 1920.

per 1,000 wounds. It remained at this level during 1915 but rose during 1916. In January, 1917, it reached the maximum for that part of the war, the rate being 2.8. By December this rate was 0.3. The rates of the latter part of the war were sufficiently low to overcome the very high rates of the pre-vaccination months of 1914 and to bring the rate to 1.17.

During this time, the method of treatment of wounds varied and likewise the method of using antitoxin as a preventive. At first wounds were sealed in just as they were or certainly without adequate cleansing. Later it became customary to clean away not only all dirt but all mangled, torn up tissue. No culture media is better for tetanus bacilli than dead and dying tissues. Instead of closing wounds tightly they were covered with open dressings. Bruce says "the surgeon's knife is the best preventive of tetanus."

At the very first (no antitoxin was given as a preventive because none was available. At first one prophylactic injection of from 1,000 to 1,500 units was given. This was changed to four injections of 500 units each given at seven-day intervals. In August, 1918, this was increased to 1,500 units at an injection, and four injections at seven-day intervals. Later the dose went back to 500 units as this was found to be as efficacious as 1,500.

In prognosis of the disease it was found that when trismus was the first symptom and the jaws were set tight within twenty-four hours the mortality rate was 71.4. When trismus was the first symptom and the closure was incomplete at the end of twenty-four hours the rate was 50. Where there was incomplete closure the rate was 24.9 per cent. When trismus was a late symptom it was 18.6 per cent.

In local tetanus there was no death rate. The length of the incubation period varied; 9.5 per cent. of the cases developed in the first week after injury; 28 per cent. during the second week; and 31.7 per cent. after the fifth week.

The length of the incubation period rose steadily as the war went on. The mortality rate fell as the incubation period lengthened. When the case developed in the first week it was 58 per cent., in the second week, 49 per cent., in the third week, 30 per cent., in the fourth week, 27 per cent., in the fifth week, 18 per cent. After the fifth week it was 15 per cent.

It is not appropriate to say much here about the therapeutic use of antitoxin. They used from 24,000 to 72,000 units preferring the larger doses. The best route of administration was the intrathecal. Anaphylaxis was not rare. There are four types of tetanus bacilli all producing toxins. The antitoxin should be made by the use of toxins from all four types.

Trichomonas Infection. W. D. Stovall[7] reports several cases to prove that trichomonas infection occurs in Wisconsin in persons who have never been in more tropical sections. The symptoms of trichomonas infection are diarrhea with colicky pains, watery or slimy blood-stained stools, weakness, dyspnea, loss of weight, progressive anemia, simulating pernicious anemia, yellow skin with urticarial or pellagroid eruptions. Later there may be bloody stools. Chronic cases give a history of alternating diarrhea and constipation.

Ringworm. Ringworm of the scalp is everywhere a problem for school medical officers. James Fenton[8] records a very satisfactory method of handling this situation employed in Shrewsbury. In this community there are 4,494 school children. Among these there were 111 cases of ringworm of the scalp, several of which had been under treatment for several years.

The loss of attendance among seventy-seven of these children during 1915 was 11,125 days, equal to a total absence for the year of twenty-seven children. In England, the State grants 36 shillings *per annum* to the local school authorities for each school child in attendance but against this absences are charged. The loss to the local schools for non-attendance of these seventy-seven ringworm children was £48/12.

Children are excluded from school on account of ringworm.

In 1915, the authorities made an arrangement to have the children treated by an x-ray specialist in Birmingham. The specialist was paid £2/25/6 for each child

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(7) Wisconsin Med. Jour., 1919, p. 189.
(8) Medical Officer, Jan. 3, 1920.

cured. The school nurse takes the children to the specialist in groups leaving on the 11 *a.m.* train and returning at 6 *p.m.* In all except two cases, one treatment was enough to cure. In these two cases the entire scalp was affected. It was divided into patches and treated in five exposures but in each case a small area of scalp was overlooked and a second visit was required. The total cost, including travelling expenses, was £66/4/11, in 1919. At the time of writing there are but two cases of ringworm of the scalp among the school children of Shrewsbury. They are the children of parents who claim to object conscientiously to having their children cured.

Scurvy. Scurvy of rather a bad type is endemic in Russia in the spring. It requires a diet devoid of antiscorbutic properties continued for from four and one-half to six months to cause the disease to develop in typical form. Milder scurvies, masked scurvies, mental depression, irritability, pallor and bleeding gums due to mild scurvy can develop in less time. J. D. Comrie[9] found germinated peas and beans a good preventive of and cure for scurvy. Peas and beans are soaked in water for thirty-six hours or until germination has started. They are removed from the water and laid for from thirty-six to forty-eight hours between layers of damp cloth. At the end of this time the sprouts are half an inch long. They are then cooked in milk or water for not more than thirty minutes and served. This is the method of Chick and Hume.

Chick, Hume and Skelton proved that not even good quality fresh cow's milk was much of an antiscorbutic.

Rickets. L. Findley, M. Ferguson and A. Paton[1] offer one of the most illuminating discussions of rickets available. Whether parents are country or city bred has no influence on the incidence of rickets. While the state of health of the mother is of no importance in the causation of rickets her habits and her care of her children are very important.

The disease affects 50 per cent. of the poorer class children in Glasgow. It is somewhat more prevalent among males. The most frequent age of onset is from

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(9) Edinburgh Med. Jour., April, 1920.
(1) Special Rep., Series No. 20, Nat. Health Insur.

6 to 18 months. It is most prevalent in late winter and early spring.

Of rachitic children 42 per cent. have had tetany, and 33 per cent. diarrhea, this being three times the proportion for all children.

The duration of breast-feeding is not a factor. The majority of the affected children had enough fat when young. The age at which bottle feeding commenced is not a factor. Diet was not a factor. There is no evidence that deficiency of milk, butter or fat soluble A. is a determining factor.

And having disposed of many suggestions the authors turn to the positive side. Inadequate air and exercise are potent in its causation as is a large number of children in the family. The social condition of the families in which there is rickets is lower than those of families with no rickets. There are generally several cases in the same family. The actual conditions of the home are more important factors than the neighborhood. The average number of persons per room was almost one person greater in the rachitic families. The cubic air space per person was 32 per cent. less. The cleanliness of the homes was distinctly worse.

Rickets is very uncommon in the garden cities Bourneville and Port Sunlight.

Sprue. M. F. Boyd[2] saw some sprue in Texas among people who had never been outside of the United States. He was led to believe that the disease was potential of considerable harm, and might even equal pellagra or hookworm in the harm it did.

Pellagra. Seale Harris[3] sees in the experiences of the various European countries, and especially Italy, a mass refutation of the theory of Goldberger that pellagra results from a low protein diet. Since 1916 and perhaps even before there has been a serious shortage of meat and wheat in Italy. For many years, in fact, the Italians' diet has been low in proteins and milk vitamines and high in carbohydrates. They have lived during the war largely on cornmeal, rice, potatoes, vegetables, and beet sugar. In spite of the use of this pel-

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(2) Southern Med. Jour., April, 1920.
(3) New Orleans Med. and Surg. Jour., February, 1920.

lagra-producing diet by practically all the people, pellagra is disappearing from Italy. Since the war began there has been an increase of tuberculosis and scurvy, an increase in the general death rate and the death rate of children.

In Rome, Harris was informed that there was no pellagra around there but that it could be found in northern Italy. In northern Italy he and other Americans accustomed to pellagra were unable to find the disease. The Surgeon-General of the Italian Army reported that there had been only a few cases among the five or six million soldiers. Only thirty-four of the men examined by the draft were rejected on account of pellagra.

The Vital Statistics Division of the Italian Public Health Service reported that pellagra had decreased enormously in Italy during the past two decades but there were no figures to prove it.

The Italian physicians do not accept Goldberger's theory. Most Italian physicians, according to Harris, also reject Coni's theory, Sanborn's and Allesandri's and hold that the cause is yet to be discovered.

In one district over which the Italians and Austrians fought for two years and where food conditions were very bad there was no pellagra. Confirmatory proof or rather disproof of the same kind he found in Austria, Hungary and Germany. He found much evidence of under-nourishment in Germany. The diet for the past four years has been one that commonly is held responsible for pellagra yet the physicians reported they had never seen the disease.

Harris holds that the promulgation of the Goldberger theory by diversifying farming and by increasing the protein in the southern diet has done good. He thinks there is considerable reason for thinking diet a factor but he does not think Goldberger's theory is right. European experience has wellnigh eliminated it.

Pellagra and Sanitation. J. Goldberger, G. A. Wheeler, E. Sydenstricker and R. E. Tarbett[4] find no support for the theory that bad sanitation is respon-

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(4) Public Health Rep., July 16, 1920.

sible for pellagra. This conclusion is based on a study of seven South Carolina mill villages. A census of all cases in these villages and the rates per 1,000 in each were plotted. A second study resulted in a plotting of the first attack rate of each. Next a census of cases of typhoid fever occurring in the same villages was taken and the typhoid rates were plotted on the pellagra rate charts.

The next study was the sanitary rating of the different villages. The villages were scored on a score card on which a perfect water supply was rated 40, perfect disposal of human excrement 32, perfect general sanitary control 12.5, perfect control of communicable diseases 12.5 and perfect domestic environment and habits of population 3. This was likewise plotted.

Because of their supposed importance in relation to pellagra, the excreta-disposal ratings and water-supply rating were each plotted separately. When all these entries had been plotted the various diagrams were compared and analyzed. It was found that there was no definite relation between bad sanitation, typhoid fever and pellagra. Some villages with a low sanitary rating had a high pellagra rate and *vice versa.*

Pellagra in the United States. According to S. R. Roberts[5] from 1902 to 1920 there were 500,000 cases of pellagra with 50,000 deaths in the United States. In 1916, the disease ranked fourth in causes of death in Mississippi occasioning 840 fatalities; in Alabama, it was third with 677 deaths; in South Carolina, second with 627 deaths. It caused 607 deaths in Tennessee and 452 in Texas or 3,700 deaths in six states.

The disease has declined from 25 to 75 per cent. since 1916. Not only is the disease less abundant but it is also less severe. Acute typhoid pellagra is becoming comparatively rare. Cases of pellagra without dermatitis, *pellagra sine pellagra,* are becoming common. Milder cases with early improvement and evidence of cure are increasingly frequent. A type now frequently found is pellagra in multiparae. An overworked mother of many children suffering from perineal laceration,

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(5) Med. Insurance and Health Conservation, July, 1920.

constipation, visceroptosis, and loss of appetite, has flurries of diarrhea, loss of subcutaneous fat, pinkish face and hands, roughened elbows and knees, raw tongue tip, weakness, low pressure and rising pulse. Such a typical pellagra is not infrequently found and perhaps frequently overlooked.

A diet list for a person during an attack of pellagra is as follows:

6 eggs
6 glasses milk
2 glasses cream
½ heaping tablespoonful sugar
1 tablespoonful cocoa
2 slices milk toast
3 heaping tablespoonsful of oatmeal
1½ heaping tablespoonsful of apple sauce
3 balls or patties (1 ounce) of butter

Drug Addiction. E. S. Bishop[6] contends that drug addiction is a disease and must be handled from that viewpoint rather than from the vice viewpoint. A drug addiction clinic as a medical institution has his approval but as a police institution not so. Primarily he is not opposed to registration of addicts but at the present time addiction has been so nearly universally labeled as a crime and a vice that he does not think registration can be effectively operated. There are no specifics and cures for drug addiction. The widely advertised cures are without therapeutic merit.

Goiter. D. Marine and O. P. Kimball[7] found goiter quite prevalent among the school children of Akron, Cleveland and Warren, Ohio. In Akron, of 9,679 girls examined in three years 51.36 per cent. had normal and 48.64 had enlarged thyroids. In Cleveland, of 406 girls examined 62.31 per cent. had normal and 37.69 per cent. had enlarged thyroids. Of 273 boys, 81.68 per cent. had normal and 18.32 per cent. had enlarged thyroids. In Warren of the girls examined 75.57 per cent. had normal and 24.43 enlarged thyroids. Of 911 boys examined in Warren 90.46 had normal and 9.55 per cent. enlarged thyroids. In these mainly young school children goiter is a little more than twice as frequent among girls at it is among boys.

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(6) Amer. Jour. Pub. Health, January, 1920.
(7) Ohio State Med. Jour., October, 1920.

Prevalence of Cancer. An important contribution to the public health literature on cancer is that of L. I. Dublin.[8] The investigation related to 37,666 deaths from cancer among policy holders of the Metropolitan Life Insurance Company. The cancer death rate was 70 per 100,000, divided as follows: Buccal cavity, 2.5; stomach, liver, 26.3; peritoneum, intestines, rectum, 8.3; female genitals, 14.7; breast, 6.7; skin, 1.7; other organs, 9.8.

The death rate was higher among whites than among colored. The death rate per 100,000, according to age was: 1 to 4 years, 3.7; 5 to 9 years, 1.4; 10 to 14 years, 1.3; 15 to 19 years, 2.8; 20 to 24 years, 4.1; 25 to 34 years, 15.7; 35 to 44 years, 76.2; 45 to 54 years, 198.6; 55 to 64 years, 382.5; 65 to 74 years, 617.2; 75 years and over, 818.2.

Among whites, cancer in females is one and two-thirds more prevalent than in males. Dublin holds:

1. The current medical opinion that there is a strong association between low economic status and a low cancer death rate is in all probability unfounded.
2. The cancer mortality rate at the ages when the cancer rate is significant decrease as we go up in the economic scale.

Dublin thinks that the data in his possession do not indicate that cancer is increasing.

Control of Cancer. L. D. Bristol[9] gives the following summary of facts concerning cancer, as stated by the Public Health Service, which every person over 30 years of age should know:

1. Cancer at the beginning is usually painless and at its onset for this reason is especially insidious and dangerous.
2. Cancer is at first a small local growth which can safely and easily be removed by competent surgical or other treatment.
3. Cancer is not a constitutional or blood disease.
4. Cancer is not contagious.
5. Cancer is, practically speaking, not hereditary.

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(8) Jour. Cancer Research, July, 1919.
(9) Bull. Maine Dept. Health, February-March, 1920.

6. Every lump in the breast should be examined by a competent physician.

7. Persistent abnormal discharge or bleeding is suspicious.

8. Sores, cracks, lacerations, lumps and ulcers which do not heal and warts, moles or birthmarks which change in size, color or appearance may turn into cancers unless treated and cured.

9. Probably 60 per cent. of cancers of the rectum are first regarded as piles. Insist on a thorough medical examination.

10. Continued irritation in some form is the usual cause of cancer. It rarely results from a sudden injury.

11. A physician who treats a suspicious symptom without making a thorough examination does not know his business.

Bristol as chairman of the Laboratory Committee of the American Society for the Control of Cancer says that provision should be made in each state for the microscopic examination of tissues suspected of being cancerous. This provision should be under public auspices and it should be free, preferably. Whenever possible this work should be done in the laboratory of the state board of health.

In 1917, cancer ranked fifth among the causes of death. The cancer rate is probably increasing. Of all deaths from cancer, 95 per cent. occur in persons over 35 years of age. At ages over 40, one-tenth of the deaths are due to cancer. Out of 90,000 deaths from cancer, 35,000 are due to cancer of the stomach and liver, 13,000 to cancer of the female generative organs, 8,500 to cancer of the breast, 3,500 to cancer of the mouth and tongue, 12,000 to cancer of the intestines and rectum, 3,500 to cancer of the skin and 14,500 to cancer of all other organs. One-eighth of all deaths of women over 40 and one-fourteenth of the deaths of all men over 40 are due to cancer.

Heart Disease. In the registration area of the United States in 1917, 12.1 per cent. of all deaths were due to heart disease. Dr. L. A. Conner[10] says that 1.6 per cent.

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(10) Jour. Amer. Med. Ass'n., June 5, 1920.

of all the school children examined in New York in 1918 had heart defects. Of all the men examined for the draft 42.3 per thousand or 4.23 per cent. were rejected on account of heart disease. He quotes F. L. Hoffman as saying that one-eighth of all deaths and one-fifth of the deaths of persons over 40 years of age insured in the Prudential Life Insurance Company are due to heart disease.

The importance of the problem in New York City led to the organization of an Association for the Prevention and Relief of Heart Disease. This organization has promoted the formation of twenty-seven special heart dispensary classes with 3,000 members. It has increased the facilities for the care of heart cases in convalescent homes; it has aroused interest in the prevention of heart disease in children and, finally, has stimulated the development of trades for heart patients.

In the discussion, A. Lambert said that the great cause of heart disease in children is sepsis or rheumatism; 76 per cent. of rheumatic children under 10 years of age had heart trouble. The heart disease which originates between 30 and 50 is generally due to syphilis. That which comes on after 50 is due to degenerations—atheroma, arteriosclerosis.

Patients with heart trouble should avoid alcohol, tobacco and stair climbing. Since tonsils and teeth have been better cared for heart disease has lessened as shown by the records of Bellevue.

B. A. Ledbetter said that a man must not be laid up or directed to lead the life of a semi-invalid merely because he has a heart murmur. What counts is the tone of the heart muscle.

Venereal Disease Control in the A. E. F. P. M. Ashburn[1] undertook to evaluate the various procedures which were employed to control venereal disease in the army in France. He rated the effectiveness of antivenereal measures as follows:

First, those that keep unchaste; second, those that diminish the opportunities for sexual contact, especially efforts at the suppression of prostitution; third,

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(1) Jour. Amer. Med. Ass'n., Dec. 13, 1919.

those that diminish the dangers of contact especially by venereal prophylaxis; fourth, those that exact punishment.

In an intimate investigation of the conduct of 13,648 white men he found that 34 per cent. abstained from intercourse while in France, from eight months to two years, averaging ten months. The reason for this related more to character than to the educational effect of the campaign. There were such consideration as loyalty to wife, to sweetheart, to religion, to principle, to pledges made.

Another third indulged in intercourse infrequently. The campaign of education and moral prophylaxis and the attitude of the officers was a factor in this.

Ashburn estimates that in France there were about thirty unprotected contacts with women of promiscuous sexual habits for each case of resulting venereal disease while prophylaxis reduced the incidence to about one-third or, roughly, to ninety exposures for each infection. Venereal incidence rises and falls with the rate of contacts or the intercourse rate. The house of prostitution is condemned by its fruits and as a producer of venereal disease, as well as a sin against marriage and against a society grounded on monogamous marriage, and as a corruptor of police and public morals.

Inspection for venereal disease twice a month was of great aid. The examination of prostitutes to segregate those found infective was helpful. Their examination with a view to certification that they were free from disease does harm and probably does no good.

(*a*) The inspection is too superficial to be accurate. Col. George Walker reports that in five years only five cases of syphilis were detected by official examiners in the houses of prostitution of Paris.

(*b*) It is not practicable to examine the prostitute after each exposure and some such frequency of examination is necessary for the certificate to mean what it says.

(*c*) The prostitute is financially interested in getting a certificate and she practices deception of various kinds to cover up her infectiveness.

(*d*) A competent examination is too expensive and time-consuming to be practical.

Ashburn holds that the use of prophylaxis after exposure is justified by the experience in France. He concludes that prophylaxis as used in France is less effective against chancroid than it is against syphilis and gonorrhea.

Efficacy of Venereal Prophylaxis. P. M. Ashburn[2] expresses the opinion that venereal prophylaxis ar early treatment following impure connection reduces the liability to venereal infection to one-third of what it would be without it. This opinion is based upon a confidential report of 5,000 soldiers with venereal diseases. Each soldier questioned was asked to report truthfully or to decline to report but in no event would the information be used against the reporter.

Of those exposed and taking preventive treatment within 15 minutes only 5.6 per cent contracted venereal diseases. Other data gathered were as follows:

30 minutes	438 cases	18.5 per cent.
45 minutes	570 cases	21.6 per cent.
1 hour	1,015 cases	43 per cent.
2 hours	1,629 cases	69 per cent.
3 hours	1,884 cases	79.8 per cent.
4 hours	1,998 cases	84.6 per cent.
After 4 and within 12 hours	196 cases	8.3 per cent.
Period not stated	165 cases	6.9 per cent.

Incidentally this table gives an idea as to the time which elapsed before treatment and was applied for among 7,892 soldiers. The average time elapsing is 2½ hours. The average percentage of persons who developed venereal disease after taking treatment was 62. The distribution as between the various forms of venereal disease with and without prophylaxis is as follows:

	Gonorrhea	Chancroid	Syphilis
Without prophylaxis ...	67.2	15.6	17.2
With prophylaxis	64.5	18.9	16.6

The decrease in gonorrhea of 2.7 per cent. and of syphilis 0.6 per cent. was absorbed by an increase of

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(2) Jour. Amer. Med. Ass'n., May 8, 1920.

chancroid of 3.3 per cent. This change may be explained by a decrease in gonorrhea and syphilis greater than the decrease in chancroid because (*a*) many of the reports are from the Philippines where chancroid is more prevalent than in the states, (*b*) perhaps inunction was relatively neglected, (*c*) rubbing may have caused cracks and abrasions from which chancroid developed.

Incidence of Venereal Disease in the A. E. F. Disciplinary and social measures reduced the venereal disease rates applied to American troops in the Paris district cut in half the venereal disease rate of 330 per 1,000, according to J. E. Moore.[3] He says that in Paris it was impossible to suppress or greatly repress prostitution and also to control assignation hotels. Therefore, the measures for control of venereal disease among American troops was practically limited to early treatment. This prophylactic measure ultimately reduced the rate to 94 per thousand, about the regular army peace time rate.

The exposures amounted to 76 per thousand weekly for permanent troops and 218 per thousand for casuals. Moore concludes that prophylaxis was the most powerful weapon available; it was efficacious in an unexpectedly high proportion of cases. It was the largest single factor in the prevention of venereal disease among troops in the Paris district. Based on Ashburn's figures, it is estimated that 2,571 new cases of disease were prevented. The statistics presented show that prophylaxis is 99.6 per cent. efficient in the circumstances under which it was employed. Prophylaxis is probably equally efficacious against all three venereal diseases.

The number of soldiers in the district during the period under report increased from 5,000 to 22,000 and in addition there were large numbers of casuals. It was necessary either to furnish prophylactic packets or to provide a large number of treatment stations. The first plan was rejected because it had been tried in the Navy before the war and had failed and also because it failed with the New Zealand Expeditionary Force in France. It was decided to open a station in each build-

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(3) Jour. Amer. Med. Ass'n., Oct. 2, 1920.

ing housing more than fifty Americans. By February, 1919, seventy-two stations had been opened. Lists of stations giving location were posted on company bulletin boards. The following was the standard treatment employed in each station:

Under no circumstances was a patient (even an officer) allowed to administer the treatment to himself; it must always be done by the attendant. If for any reason the attendant was unable to employ the treatment exactly as directed, he must state the reasons therefor and the deviation adopted on the prophylactic record. As a first step, the patient was instructed to urinate. Then he was provided with a pint of warm water in a basin and a gauze wipe, with which he washed thoroughly, while the attendant dropped liquid soap on the penis. An examination of the genitalia was made; if the patient had a discharge or a genital sore, the fact was noted on the record and the patient instructed to report to the clinic, but this was as far as the attendant was allowed to go in making a diagnosis. He must continue the treatment as usual. The next morning, on receipt of the records at the clinic, all such records were separated from the others, and the commanding officer of the patient's organization requested him to report for examination at once. The next step was the injection of 1 dram of a 2 per cent. protargol solution (freshly made up twice a week and kept in a closely stoppered bottle to avoid deterioration) into the urethra by the attendant. The patient then held the meatus firmly between the thumb and forefinger for five minutes, from time to time allowing a drop to escape from the meatus so that all parts of the urethra were in contact with the solution. At the end of five minutes, the protargol was allowed to escape without pressure so that a few drops remained. One-half dram of 33.33 per cent. calomel ointment was next rubbed thoroughly by the patient, under the observation of the attendant, into all parts of the penis for five minutes, special attention being paid to the retracted prepuse, the frenum and the glans. Finally the penis was wrapped in toilet paper to protect the clothes, and the patient instructed not to urinate for four or five hours. Throughout, the strictest precautions as regards sterility of syringes by boiling was maintained to prevent transfer of infection from one patient to another.

Records were kept and the attendants at the station were not only trained but they were marked on the success or failure of the treatments. The total number of treatments given was 95,916 and the number of new cases of venereal disease was 1,845. Of these patients, 56.2 per cent. stated they had used no treatment. It was not possible to check statements as to all of these. It was possible to keep a better track of the 63,344 treated between Nov. 1, 1918, and March 5, 1919. During this period, 1,562 developed venereal diseases. Of these 953 or 59.7 per cent. did not have prophylactic treatment; 387 or 24.7 per cent. claimed to have had treatment but no record of the fact could be found; 131 or 8.5 per cent. had failures because of the fault of the men; and eleven or 6.8 per cent. had genuine failures. Of the 139 men who claimed prophylaxis was given at the Paris station, forty-four or 31.9 per cent. were not on record as having had prophylaxis. Twenty-six or 18.7 per cent. took prophylaxis more than eight hours after exposure. In ten cases the date of development of the disease indicated an exposure other than the one for which prophylaxis was given. In ten cases there was a history of multiple exposure; ten had venereal disease at time of treatment; four failed to follow direction; thirty-five or 25.1 per cent. were genuine failures of treatment. In Paris there were fifty-two exposures with prophylaxis for each case of disease.

Venereal Diseases Poster. A. M. Fraser[4] gives the following text as it appears on a V. D. warning poster which is generally displayed in suitable places in the borough of Portsmouth, England. It is headed "What Every Man Should Know":

1. Venereal diseases (*i. e.*, syphilis or "pox," and gonorrhea or "clap") are the common result of promiscuous sexual intercourse.

2. *Venereal diseases not only result in immediate suffering, but are often the cause of early death. Worst*

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[4] Med. Officer, Aug. 21, 1920.

of all they are the cause of blind, diseased and deformed children being born into the world, and of life-long suffering to innocent wives.

3. *To avoid venereal disease the only absolutely safe course, the right and manly course, is to avoid fornication. Male chastity, although it demands the exercise of self-discipline, is quite consistent with perfect health.*

4. If any man indulges in promiscuous sexual intercourse it is his bounden duty, in order to avoid disease which he may pass on to innocent people, to adopt the following simple measures, which are the best known to medical science for preventing disease after exposure to infection.

5. After exposure to infection he should at once retire to some convenient place, wet a piece of cotton wool with a *solution of permanganate of potash or Condy's fluid* and thoroughly swab the male organ—see that every part is wetted with the solution. It is of the utmost importance that this should be done *as soon as possible* after exposure to infection. (The strength of the solution of permanganate of potash is 1-1,000; it can be made by dissolving in a glass of water as much of permanganate of potash crystals as will cover a sixpence.)

6. The above method of prevention of disease is based on the fact that venereal diseases are caused by living germs which, after exposure to infection, lie on the surface of the skin, and the *prompt* application of the above solution (or, indeed, of any other effective disinfectant) destroys them before they can gain access to the system and set up disease.

7. *All men are earnestly advised to abstain from the sin of promiscuous sexual intercourse. If they neglect this advice they are besought carefully to observe the above instructions. To fail in this will involve suffering in the future upon innocent women and children.*

Conclusions of the British National Council as to Prophylaxis.[5] The prevention of venereal disease is a large socio-medical problem. In the direct line of at-

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(5) Med. Officer, Dec. 6, 1919.

tack ample facilities for treatment and instruction of the public occupy the first place.

It is no part of our policy to conceal the truth and we have always acknowledged the value of cleansing and disinfecting materials applied early and thoroughly in diminishing the risk of disease.

Abstention from exposure to infection is the only certain safeguard against the ordinary risk of disease; continence is to be encouraged by every means and on every ground both social and hygienic.

No person who has indulged in promiscuous intercourse can be sure that he is not infected and every such person is therefore bound in duty to himself (or herself) and to society to seek means of cleansing at the earliest moment.

For this purpose a thorough local application of soap and water is of great value followed (if possible) by the use of such disinfectants as may be recommended by a medical practitioner.

While such applications if properly used do sensibly reduce the risk of disease if applied within four hours after exposure they afford no certain security. They do not in the slightest degree prevent the contraction of syphilis on other parts of the body than those disinfected. These applications are not suitable for the treatment of the disease when once contracted.

The case of women must not be ignored. Satisfactory self disinfection by them is practically impossible and skilled medical attention at the earliest possible moment is absolutely necessary.

No one should be urged to arm himself in advance with a prophylactic packet.

It must be insisted upon that the question of chemical disinfection is only one aspect of the problem of combating venereal disease.

INDUSTRIAL HYGIENE

Modern Medicine[4] publishes the following tabulated information:

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(4) March, 1920.

MAXIMUM PERIODS AND AMOUNTS OF MEDICAL SERVICE UNDER VARIOUS COMPENSATION LAWS.

State	Maximum period	Maximum amount	State	Maximum period	Maximum amount
Alabama	60 days	$100	New Jersey	4 weeks[1]	[1]$50
Alaska	....	....	New Mexico	2 weeks	$50
Arizona	....	....	New York	60 days[1]	Unlimited.
California	Unlimited	Unlimited.	North Dakota	Unlimited	....do....
Colorado	60 days	$200	Ohio	...do	[1]$200
Connecticut	Unlimited	Unlimited.	Oklahoma	60 days[1]	[1]$100
Delaware	2 weeks	$75	Oregon	Unlimited	[1]$250
Hawaii	Unlimited	$150	Pennsylvania	30 days	[1]$100
Idaho	...do	Unlimited.	Porto Rico	Unlimited	Unlimited.
Illinois	8 weeks[1]	[1]$200	Rhode Island	4 weeks	....do....
Indiana	30 days[1]	Unlimited.	South Dakota	12 weeks	$150
Iowa	4 weeks	[1]$100	Tennessee	30 days	$100
Kansas	50 days	$150	Texas	2 weeks[1]	Unlimited.
Kentucky	90 days	$100	Utah	Unlimited	$500
Louisiana	Unlimited	$150	Vermont	2 weeks	$100
Maine	30 days[1]	[1]$100	Virginia	30 days	Unlimited.
Maryland	Unlimited	$150	Washington	Unlimited[2]	....do[2]...
Massachusetts	2 weeks[1]	Unlimited.	West Virginia	Unlimited	$600
Michigan	90 days	... do....	Wisconsin	90 days[1]	Unlimited.
Minnesota	...do[1]	[1]$100	Wyoming	Unlimited	$100
Missouri	8 weeks	$200	United States	...do	Unlimited.
Montana	2 weeks	$50			
Nebraska	Unlimited	$200			
Nevada	90 days[1]	Unlimited.			
New Hampshire	....	....			

[1] Additional service in special cases or in discretion of commission.

[2] Employees must pay one-half of medical cost.

Compensation for Loss of Vision. Frank Allport[5] attempts to standardize the compensation table for visual losses of one eye occurring in industrial establishments working under a workmen's compensation act in order to forestall some of the conflicting expert testimony offered in the trial of such cases.

COMPENSATION TABLE FOR VISUAL LOSSES OF ONE EYE.

	Visual efficiency	Loss of vision
20/20 indicates	100%	0.0%
20/30 indicates	94.5%	5.5%
20/40 indicates	89.0%	11.0%
20/50 indicates	83.5%	16.5%
20/60 indicates	78.0%	22.0%
20/70 indicates	72.5%	27.5%
20/80 indicates	67.0%	33.0%
20/90 indicates	61.5%	38.5%
20/100 indicates	56.0%	44.0%
20/110 indicates	50.0%	50.0%
20/120 indicates	41.0%	59.0%
20/130 indicates	36.5%	63.5%
20/140 indicates	32.0%	68.0%
20/150 indicates	28.5%	71.5%
20/160 indicates	23.0%	77.0%
20/170 indicates	18.5%	81.5%
20/180 indicates	14.0%	86.0%
20/190 indicates	12.0%	88.0%
20/200 indicates	10.0%	90.0%

Furthermore, in order to guard against unjust claims for visual losses and impairment of hearing he advises that all employees be given examination of the sight and hearing by competent men at the time they enter employment.

In proof of the importance of this two cases are cited: A many who had received a slight head blow sued for damages resulting from blindness. Examination showed chronic simple glaucoma with atrophied disc. A second man who had been slightly wounded in the head claimed that deafness had resulted. Examination showed chronic otorrhea, necrosis, foul discharge and an aural polyp. Nevertheless they recovered damages.

Studies of Dust. For a long time there existed contradiction of opinions as to the harmfulness of dust

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(5) Jour. Amer. Med. Ass'n., Jan. 17, 1920.

which were embarrassing to those who contended for cleaner air. A part of this was due to lack of accurate statistical studies as to the pneumonias, the various forms of pulmonary tuberculosis and the various chronic inflammations of the lungs which are non-tuberculous in character. Another part was due to the lack of differentiation between the harmfulness of different kinds of dust. First, there was effort to divide dusts into organic and inorganic. Later there came studies as to the harmfulness of different kinds of inorganic dust.

No one has contributed so much to the nicer studies of the inorganic dusts as C. E. A. Winslow.[6] His most recent addition to the collection is a study of the dust hazard in the wet and dry shops of an ax factory. This study shows that wet grinding as done is more deadly than dry grinding. When dry grinding machines are properly hooded and connected with exhaust fans less dust escapes into the air of the room and less sickness results among the occupants of the room than when wet grinding is done. In the wet grinding of axes the wheels must run so as to throw the dust up rather than down and the speed friction and heat are sufficiently great to make the grinding process essentially a dry one in spite of the application of water. In consequence of this the air is filled with dust and the death rate is high.

Herbert Drury found that the average tuberculosis rate among adult males 1900-1918 in Connecticut was 1.7 per 1,000. For the employees of the factory other than grinders and polishers, 1.6 per 1,000; for polishers and grinders about 16 per 1,000. A physician wrote Winslow that forty years ago the grinders were Yankees and they ground for about twenty years. They were followed by French Canadians and they could grind for from twelve to sixteen years before breaking down. The Swedes got grinder's consumption after grinding for from eight to ten years. They in turn were followed by Finns and Polanders and they get the disease after grinding from three to five years.

An analysis seemed to indicate that the trouble lay

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(6) Public Health Rep., Oct. 8, 1920.

in the wet grinding rather than in the dry polishing of the axes. Examination of the air was made by the standard methods for the examination of air American Public Health Association. In the air of the polishing room the number of dust particles 10 microns and under (designated as one-fourth standard unit and the size of greater significance from the health standpoint) varied from 51,000 to 400,000 per cubic foot and averaged 154,500 while the weight of the dust varied from 0.019 to 0.101 milligrams per cubic foot of air and averaged 0.055.[7] The standards of safety there set were weight of dust in an 0.03 milligrams per cubic foot of air and the number of dust particles one-fourth standard unit in size and below (10 mikrons and below) 200,000 per cubic foot. Judged by these standards the dust in the air of the polishing shops is not bad.

But that in the wet grinding room tells another story. In these rooms the number of dust particles of the harmful size averaged 15,800,000 per cubic foot. The best showing was 870,000 and the worst 50,000,000. The weights ranged from 0.079 to 1.241 and the average was 0.414. The percentage of the dust which was inorganic ranged from 90.4 to 99.9.

The examination of the air confirmed the conclusions of the statisticians and clinicians to the effect that axe grinding and polishing is a very hazardous occupation and that the chief hazard lies in wet grinding.

Winslow says that it is never safe to recommend a process on general principles without having a laboratory check. The off-hand opinion of anyone who has not made laboratory checks would be that wet grinding is safer than dry polishing.[8]

Helmets as a Protection Against Dust. C. E. A. Winslow[9] advocates the protection of sand blasters against dust hazard by having them wear helmets provided with positive air pressure and simple respirators. The introduction of 2.5 to 3 cubic feet of air a minute through a one-fourth inch hole at the top of the helmet is enough.

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(7) Standards for Measuring the Efficiency of Exhaust Systems in Polishing Shops, Public Health Rep., Mar. 7, 1919.

(8) Public Health Rep., May 30, 1919 and March 5, 1920.

(9) Ibid., March 5, 1920.

Acute Carbon Monoxide Poisoning. According to L. I. Harris,[1] there are many persons in industrial communities who suffer from headaches, marked anemia and gastric symptoms whose trouble is due to mild carbon monoxide poisoning. In one winter in New York City he found 220 cases of acute carbon monoxide poisoning among people who worked in close, ill-ventilated shops where gas flames were used for pressing and where furnaces were in operation. In a tall building a wind blew the output of a smokestack into a workroom causing seventy-three operatives to sicken suddenly with carbon monoxide poisoning.

Harris' investigation of workers in hides and hair have led him to believe that in addition to a moderate number of cases of definite anthrax there were a great many boils, carbuncles and cases of erysipelas which were really cases of mild anthrax. An investigation of 109 printers showed a large percentage suffering from some degree of lead poisoning. In twenty-two lead was found in the urine.

Accidents to the Eyes. According to G. L. Berry,[2] each year over 200,000 eye accidents occur in the industries and the number occurring to agricultural laborers is even greater. The type of goggles to be worn by workingmen in trades which endanger the eyes are those which conform to the established standard. The standards relate to shape, size and strength of frame. The lenses must meet a drop test and a heat test.

The treatment recommended for acid burns of the eyes is: Lay the victim on his back and thoroughly irrigate the eyes with clean running water. If no better way is at hand plunge the head in a bucket of water. Apply a bichloride salve. Bandage and send for the doctor.

The treatment given for caustic soda burns is: Take commercial acetic acid of 30 per cent. strength. To 1 quart of this add 14 quarts of water. This gives a 2 per cent. solution. Wash the eyes thoroughly with this solution. Apply sweet oil. Use no absorbent cotton as the fiber becomes imbedded in the wound. The Hooker

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(1) Jour. Amer. Med. Ass'n., Sept. 20, 1920.
(2) Med. Rev. Reviews, November, 1919.

Electric Company uses from 1 to 2 per cent. solution of zinc sulphate; 12-ounce bottles of this solution are distributed throughout the plant. When a man gets an eye burn the eyes are thoroughly washed in this. It is often necessary to apply cocaine to do this. Then apply olive oil, bandage, send for the doctor.

In all those industries in which wood alcohol is used the Department of Labor of New York requires the use of fans, impervious gloves for those whose hands are in touch with the drugs, and helmets for those who work in tanks. For those workingmen who face very bright lights and high temperatures such as glass blowing, oxy-acetylene welding and the manufacture of steel there is danger of cataract and various other forms of eye injury. The harm is not so much from ultra-violet rays as it is from heat and infra-red rays. The ordinary smoked glasses, the dark blues and the reds are of practically no service, nor is cobalt blue.

W. W. Coblentz and W. B. Emerson[3] have shown that for this work gold-plated glasses are 99 per cent. efficient, sage green or bluish green, 95 per cent., black glasses 60 to 80 per cent. and greenish yellow glasses, 60 per cent. Where the light is super-bright the glasses should be black, green, or yellowish green. For working near furnaces sage green glasses are advised.

Fatigue. E. L. Scott and A. B. Hastings[4] while endeavoring to find a simple laboratory test for fatigue investigated the sulphur compounds including the sulphates and the phenols found in the urine. It is fair to say that they were unsuccessful, their findings being essentially negative. Phenol production and excretion are more influenced by habits and diet than by work. There was some tendency for total sulphur to increase as the result of work. There is an increase of the proportion of sulphate sulphur to nitrogen excreted when men labor. However, these increases are not great, the sources of error are not easily checked and the tests are technical. Normally but little protein is used as a source of energy. There is some increase, however, of excretion of protein as the result of wear and tear but

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(3) Technologic Paper No. 93, U. S. Bureau of Standards.
(4) Public Health Rep., Oct. 15, 1920.

the excretion of this slight excess lags from twelve to twenty-four hours behind the work which brought it about. That some of the sulphur contents of certain amino-acids on the way to being used by the cells but not completely incorporated in them might be oxidized by cellular respiration without destruction of the more intimately bound proteins occurred to Scott and Hastings as a possibility and induced them to begin these analyses for sulphur in the urines of men engaged in manual labor.

Rubber Rash. N. A. Shepard and S. Krall[5] conducted a series of experiments to determine the cause of and a preventive for rubber rash. In all rubber tire factories this rash is troublesome. They demonstrated that the rash was due to the accelerator. In the factory where they worked the accelerator used contained hexamethylene-tetramine or urotropine. The conclusion Shepard and Krall arrived at was that in the presence of acid sweat this yielded formaldehyde. That this penetrated the ducts of the sweat glands and there formic acid was found. The eruption was due to formic acid. The men suffer from the rash especially in the hot months.

Before the National Safety Council in 1919 it was stated that an aqueous solution of borax containing gum arabic was an effective preventive when applied to the skin and dried with electric dryers. Shepard and Krall used a saturated solution of sodium bicarbonate in water for the purpose. The men washed with soap and water and then applied the bicarbonate solution and allowed it to dry on. This was done at the beginning of the shift and at its middle. At the end of the shift it was washed off. It was a perfect preventive. They found it an effective cure in one case.

Miners' Nystagmus. The economic aspect of miners' nystagmus is discussed by T. L. Llewellyn,[6] who found that the disease keeps 6,000 men disabled all the time in Great Britain and costs the state for compensation and loss of coal output over 5 million dollars a

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(5) Jour. Indust. Hyg., May, 1920.
(6) Jour. State Med., August, 1920.

year. It lessens the output of coal three-quarters of a million tons yearly.

The average age at which it develops is 41 years and the average period of underground life is twenty-five years.

The principal cause is prolonged eyestrain from insufficient illumination. Therefore, it is suggested that the standard of illumination for mines be 0.1 foot candle over the whole working area. This illumination will be given by an electric cap light of 1 candle power or by the usual type of lamp of 3 candle power. White washing and stone dusting must be made use of wherever possible.

While the symptom develops as a result of prolonged eyestrain there are several contributing factors. Heredity plays a part. Accident, ill health and mental strain are factors. A large proportion of the men suffer from errors of refraction. In the chronic cases the mental factor is of great importance. As a rule the men afflicted recover when they rest and then pursue proper above ground work. Most cases are convalescent in from six to twelve months and free from all symptoms in from one to two years. However, return to underground work is frequently followed by relapse.

Health of Employees of Department Stores. A. B. Emmons[7] records a coöperative effort to explore the entire field of mercantile health participated in by twenty-five large department stores located between Cleveland and Boston.

In a certain store employing 700 in July, 1920, with a twenty-two working day month 240 treatments were given by the store nurse and seventy by the physician; five persons were referred to hospital; two to family physician, three to an outside physician; three were sent home on account of illness; twenty-four were rest room cases; three accidents involved compensation; two were emergency floor calls; forty heads of department and executives were treated; two customers were treated. The percentage of total employees applying was 44.5. Need for a visiting nurse was shown by absences reported

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(7) Jour. Indus. Hyg., November, 1920.

as illness, thirty-two; absences reported as due to family illness, eight.

In another store employing 3,000, 200 attended the dispensary daily, amounting to over 4,300 or 1.2 per cent. visits per employee monthly.

The labor turnover from all causes in a large establishment is over 100 per cent. a year.

Emmons recommends that a store employing 1,000 employ a physician for half his time and pay him not less than $2,500 a year. In addition, there should be two registered nurses. They should receive from $1,500 to $1,800 each. Supplies should cost $1,500, making a budget of $7,000.

Occupations for Men with Heart Disease. R. O. Moon[8] speaking of the trades for men handicapped by heart disease says that tailoring is all right provided the man does no ironing. Shoe repairing was approved provided the man does not stand at his work. Shoemaking generally requires too much use of the arms. Basket making is all right provided only small baskets are made. Leather work is all right provided the articles handled are not heavy. Motor driving is all right if the machine is equipped with a self starter. A man might work at a proper trade but break down.

Physical Therapeutic Center. In the North Staffordshire coal and iron district a physical therapeutic center to treat wounds, fractures and kindred injuries by massage and other physical means was established more than a year ago. The service was available for 45,000 employees living within a radius of five miles of the center. The cost of the year's operation was $2,100 plus $115 for depreciation, making a total of $2,210. In this time 491 cases were treated at a case cost of $450. This does not include the salary of the masseur or physical therapist and travelling expenses.

The average number of treatments given each case was 15.4. Of 446 completed cases 426 persons returned to work, twelve settled for a lump sum, six were not improved and three refused treatment. These last were neurasthenics who complained of back strains.

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(8) Brit. Med. Jour., May 8, 1920.

Teaching First Aid. M. J. Shields[9] says that the American Red Cross taught first aid to 55,000 during the year 1917. There is great advantage in teaching first aid to employees of industrial plants as well as to farmers and householders. He quotes Shoudy as advocating the teaching of first aid to classes in all large plants. The first aid squads are composed of new men each year.

Shields uses the following card of instructions—

Don't try and teach every employee first aid. Start with the foreman, the safety committeemen and some permanent employees.

Don't teach too much anatomy.

Don't use technical terms.

Don't devote much time to fancy or intricate roller bandages; use compresses and triangles.

Don't forget to condemn the routine use of the tourniquet.

Don't teach the giving of medicine.

Don't neglect to teach that an open wound is better off with nothing on it except the local air than to put a piece of waste or dirty handkerchief on it.

Don't teach the washing of wounds except with gasoline.

Don't forget to tell them that peroxide is simply "wind and water."

Don't omit to reiterate "What not to do." It is often more important than "What to do."

Don't neglect an occasion to teach safety first or first aid to the uninjured.

Don't forget to tell them that the first thing to do in an accident is to send for the doctor.

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(9) Penn. Med. Jour., December, 1919.

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